EMPOWERING SUSTAINABLE BEHAVIOR

THROUGH THE ENHANCEMENT OF SUBJECTIVE KNOWLEDGE

A DISSERTATION SUBMITTED TO THE GRADUATE DIVISION OF THE UNIVERSITY OF HAWAI'I AT MANOA IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF
DOCTOR OF PHILOSOPHY

IN

BUSINESS ADMINISTRATION

MAY 2022

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ACKNOWLEDGEMENT

I would like to express my deepest gratitude to the co-chairs of my dissertation committee, Professor Dana Alden and Professor Qimei Chen, for their continuous support and advice for the past six years. I am humbled and grateful to have learned from the two incredible and knowledgeable professors who care deeply for their students. I would not have been able to complete the degree without them.

I would especially like to thank my advisor, Professor Dana Alden, for his time and help. Professor Alden's knowledge, work ethic, and passion for his work have helped me grow as an individual and as a researcher. I am forever thankful for his guidance and unconditional support. Also, thank you, Professor Chen, for being so supportive of my study from the very first day I arrived at the University of Hawai'i. Her encouragement and advice about my research have always put me at ease, especially during challenging times over the past six years. Dr. Chen and Dr. Alden are two of the most genuine people I have ever met. I forever owe them a debt of gratitude. They are the role model for whom I want to be as a researcher.

I also would like to thank my committee members, Professor Miao Hu, Professor Min Liu, and Professor Yanmei Zheng, for taking the time out of their busy schedules to serve on the committee and provide me with their feedback. They were always there for me, without hesitation, whenever I needed their help. Thank you.

Last, I would like to thank my parents, Isara and Siriporn, and my aunt Nunta for encouraging and believing in me. My husband, Andrew, for his unconditional love and support. I would not be where I am today without you. Last, I want to thank my two beautiful daughters, Leilani and Hanalei, for their smiles. They are the reason I was able to finish.

Abstract

Sustainability is undoubtedly one of the most urgent issues of the twenty-first century. Academics and practitioners alike have stressed the importance of sustainability-related education for the future. Surprisingly, the impact of knowledge about sustainability on pro-environmental behaviors has been rather mixed. This dissertation aims to shed light on the inconsistencies in relationships between environmental knowledge and the attitude and behaviors regarding sustainability reported in the literature. Specifically, the current research examines the role of subjective knowledge and its impact on consumer attitude toward the brand and intention to purchase green products. It also investigates the mediation effect of perceived consumer effectiveness and the moderating role of a time versus money construct on subjective knowledge. The results show that high (low) subjective knowledge increases (decreases) positive attitude toward the brand and intention to purchase utilitarian green products. The dissertation also finds initial evidence that the green hedonic (versus utilitarian) product category may serve as a boundary condition to the positive relationships between subjective knowledge, attitude toward the brand, and intention to purchase. Perceived consumer effectiveness mediates the main effect. Last, the interaction effect shows that participants in the high (versus low) subjective knowledge condition express less intention to purchase the utilitarian green product when thinking about time (versus money). An additional experiment is conducted beyond the initial hypotheses, exploring high versus low construal level as a potential alternative moderator.

From a theoretical perspective, this dissertation is one of the few to establish the causal relationships among subjective knowledge, perceived consumer effectiveness and consumer choice within the sustainability domain. It also appears to be the first to examine the interaction effect between subjective knowledge and a time versus money mindset. Managerially, these

studies provide alternative intervention tools to businesses, governments, and non-profits to encourage sustainable behaviors as it demonstrates that providing consumers with scientific facts, in isolation, may not be as effective in driving behavioral changes. Additional interventions that make people feel they are knowledgeable about the subject area are recommended with a caveat that the tool appears to work well with utilitarian as opposed to hedonic green products.

Introduction and Research Objectives

Sustainability is undoubtedly an urgent modern issue. Academics and practitioners alike stress the importance of sustainability-related education (Zilahy and Huisingh 2009; Zsóka et al. 2013). For example, Lozano (2006) advocates the need for sustainable development education at universities. UNESCO similarly asserts that education "empowers people to change the way they think and work towards a sustainable future" (UNESCO 2013, 1). This sentiment is shared by other organizations, such as the United Nations Department of Economic and Social Affairs, United Nations Environment, and International Association for Management Development in Dynamic Societies. Under the umbrella of the UN, these institutions formed the Higher Education Sustainability Initiative in 2012 to provide "higher education institutions with a unique interface between higher education, science, and policy-making" (United Nation 2018, para. 1).

Education plays a critical role in knowledge building. The general idea is that education increases knowledge via systematic learning opportunities (Bradley, Waliczek and Zajicek 1999). Knowledge has long been considered a predictor of positive attitude and behaviors toward sustainable development. Surprisingly, findings on the impact of sustainable knowledge on pro-environmental behaviors have been mixed. A limited number of studies report a positive relationship between knowledge and behaviors that improve environmental accountability (e.g., Bradley, Waliczek, & Zajicek, 1999; Pe'er, Goldman, & Yavetz, 2007). Other researchers find knowledge to have a positive but weak impact on attitude toward sustainability (Arcury 1990; Ramsey and Rickson 1976; Vicente-Molina, Fernández-Sáinz and Izagirre-Olaizola 2013) and pro-environmental behaviors (Al-Naqbi & Alshannag, 2018; Ellen, 1994; Longo, Shankar, & Nuttall, 2017). Another finds no impact when controlling for elements such as norms and

efficacy (Heeren et al. 2016). These mixed results may be attributable to the overemphasis on objective knowledge (information stored in the memory) and less attention to how knowledge makes consumers feel (Armstrong, Krasny and Schuldt 2018; Findler et al. 2019). This view is consistent with Jensen (2002)'s research which posits that environmental knowledge taught in school is not action-oriented. It does not motivate, create competency and intrinsic value for consumers to take actions. Kollmuss and Agyeman (2002) also show that technical knowledge (e.g., learning about scientific knowledge in isolation) does not seem to foster pro-environmental behaviors.

This dissertation aims to shed light on inconsistencies in the relationships between environmental knowledge and sustainable attitude and behaviors reported in the literature. One possibility is that many environmental knowledge studies fail to enhance pro-ecological behaviors because they focus exclusively on improving the objective level of knowledge while neglecting individual feelings about that knowledge (Hadar, Sood and Fox 2013; Heeren et al. 2016; Ramsey and Rickson 1976; Worsley 2002). Seeking to examine this possibility, several empirical studies focus on the role of subjective knowledge, or the metacognitive feeling of knowledge (Hutchinson and Alba 2000), and its impact on sustainable behaviors, particularly attitude and intention to purchase green products, which are commonly modeled outcomes in sustainability-related investigations (e.g., Brough, Wilkie, Ma, Isaac, & Gal, 2016; Olsen, Slotegraaf, & Chandukala, 2014; Pe'er et al., 2007; Zsóka et al., 2013).

A large body of marketing research has investigated the role of knowledge and its impact on consumer decision making regarding durable products, such as electronic devices, and non-durables, such as everyday household items (e.g., Brucks, 1985; Hong & Sternthal, 2010; Hutchinson & Alba, 2000; Wood & Lynch, 2002). The emphasis on green or sustainable

products, however, has been less of a priority, though some recent scholars have identified ways to encourage consumers to "go green" (e.g., Brough, Wilkie, Ma, Isaac, & Gal, 2016; Kidwell, Farmer, & Hardesty, 2013; Newman, Gorlin, & Dhar, 2014; Olsen, Slotegraaf, & Chandukala, 2014). Furthermore, researchers (primarily outside of the marketing field) have examined the relationship between knowledge and sustainable behaviors using self-assessment scales without experimentally manipulating the construct (e.g., Aertsens, Mondelaers, Verbeke, Buysse, & Van Huylenbroeck, 2011; Pieniak et al., 2010).

This dissertation aims to fill both of these gaps in the marketing literature. Drawing on the extant consumer knowledge stream (Brucks 1985; Hutchinson and Alba 2000), the central objective is to examine the effect of subjective knowledge on attitude toward brands and intention to purchase green products using experimental designs. Consumers' subjective knowledge is hypothesized to strongly impact decision making; in particular, consumers with higher subjective knowledge are expected to exhibit more environmentally conscious behaviors.

The second objective of this dissertation is to examine the effect of subjective knowledge on brand attitude and intention to purchase hedonic versus utilitarian products. The current dissertation proposes that high subjective knowledge should lead to a higher brand attitude and intention to purchase green utilitarian but not hedonic products. Extensive studies document clear and distinct differences between utilitarian and hedonic products in terms of consumer perceptions (Babin, Darden and Griffin 1994; Luchs and Kumar 2017), attitude (Batra and Ahtola 1991; Chitturi, Raghunathan and Mahajan 2008; Okada and Hoch 2004), and choice (Choi et al. 2014; Dhar and Wertenbroch 2000). Yet, limited studies examine these constructs within the green product domain, and even fewer do so through the lens of knowledge.

Furthermore, most studies within the green product domain focus on utilitarian products, such as dishwashing soaps, hand sanitizer, and detergents (Griskevicius, Tybur and Van den Bergh 2010; Lin and Chang 2012), rather than green hedonic products (exceptions include Lundblad and Davies [2016] and Yan, Hyllegard, and Blaesi [2012]). The fashion industry, for example, is a $3 trillion business that accounts for about 10% of global CO2 emissions (Conca 2015; Mark 2019; Silvestri 2021). This industry has increasingly shifted its focus to sustainability, including using recycled materials and reducing water and energy use (Lundblad and Davies 2016; Radocchia 2018; Silvestri 2021). Given limited research, the importance of hedonic consumptions, and varying product category effects on consumer behaviors in other contexts, it is crucial to consider the hedonic versus utilitarian green product category as a potential boundary condition.

The third objective of this research is to examine the underlying mechanism of the hypothesized main effect, the positive impact of subjective knowledge on sustainable behaviors. The dissertation draws on prior studies related to perceived consumer effectiveness (PCE), a measure of the extent to which an individual perceives that he or she can contribute to sustainable development-related outcomes (Webster Jr 1975). PCE is a critical determinant of sustainable behaviors (see examples of Berger & Corbin, 1992; Ellen, Wiener, & Cobb-Walgren, 1991; Marques & Almeida, 2013). Yet, few studies examine the direct relationship between subjective knowledge and PCE. Ellen et al. (1991), for example, finds a correlation between knowledge and PCE but does not establish causation. This dissertation hypothesizes that PCE explains the underlying mechanism of the direct effect, the impact of subjective knowledge on attitude toward the brands and intention to purchase green products. Using mediation analysis and bootstrapping estimation (Zhao, Lynch Jr and Chen 2010), the study proposes that when

subjective knowledge is high, consumers believe they have high competency and that their behavior can help solve environmental issues (i.e., they have high PCE). Such enhanced self-efficacy resulting from high levels of subjective knowledge in turn leads to more favorable attitude toward brands and intention to purchase green products.

The fourth objective of this dissertation is to examine potential moderating effects of time-money trade-offs on the hypothesized main effect of subjective knowledge on attitude and purchase intention of green utilitarian products. When considering sustainable choices, consumers often trade off long-term environmental benefits (time-oriented) with higher product cost and/or lower quality (money-oriented) concerns (Luchs and Kumar 2017; White, Habib and Hardisty 2019). The concept of time-versus-money is well-documented in the context of attitude and evaluation (e.g., Mogilner & Aaker, 2009; Su & Gao, 2014), charitable giving (Liu and Aaker 2008; Zhou et al. 2018), and the pursuit of happiness (Aaker, Rudd and Mogilner 2011; DeVoe and House 2012; Mogilner 2010). Individuals with a time-mindset tend to think about their personal, emotional well-being, happiness, and desire for more social connections (Liu and Aaker 2008; Mogilner 2010). Those with a money-mindset prioritize independence and maximization of utility (Liu and Aaker 2008; Mogilner 2010). Despite the relevance of time and money trade-offs in the sustainability domain, the two constructs have not been examined in the context of purchasing green products. The present research thus hypothesizes that time-oriented (versus money-oriented) consumers who feel more knowledgeable (i.e., higher versus lower subjective knowledge) about the environment and sustainable consumption will hold more positive brand attitude and purchase intention. In contrast, neither time nor money mindsets are likely to affect brand attitude or purchase intention of green products when consumers feel that they have low knowledge about the environment and sustainability.

Last, this dissertation explores the relationship between construal level and subjective knowledge. The construal level explains how psychological distance influences individuals' thoughts and behaviors (Trope and Liberman 2010; Trope, Liberman and Wakslak 2007). The theory posits that people mentally construe psychologically near objects or events using more concrete low-level thinking and psychologically distant objects and events using more abstract high-level thinking (Trope et al. 2007). The role of the construal level has been extensively examined and applied to a variety of sustainability-related contexts (e.g., Reczek, Trudel and White 2018; Ryoo, Hyun and Sung 2017; White, MacDonnell and Dahl 2011). However, no studies within the sustainability domain appear to have examined the moderating role of construal level on subjective knowledge. This research hypothesizes that a consumer with high (low) subjective knowledge will express a more positive attitude toward the brand and higher purchase intention for a green utilitarian product when presented with a high (low) construal promotional message.

This dissertation contributes to the marketing literature in three ways. First, it aims to establish causality between subjective knowledge and pro-environmental behaviors through the use of experimental method. Second, unlike correlations found in a few previous studies, the study's goal is to establish a mediator that explains the main effect. Third, the research introduces moderators that are largely overlooked in the sustainable marketing area. From a practitioner standpoint, this research aims to identify ways to change individual perceptions to be more environmentally conscious using subjective knowledge as an intervention tool.

The remainder of this section reviews the relevant literature streams, including research on sustainability and consumer knowledge, the relationship between subjective knowledge and sustainability, time-versus-money trade-offs, product category effects, and perceived consumer

effectiveness. Next is the methods section, followed by the general discussion. The final sections discuss theoretical, managerial impactions as well as limitations and future research directions.

Literature Review

Sustainability

Sustainability is a complex concept with broad implications and a wide range of use. According to Brundtland (1987, p. 40), a Norwegian politician and Director-General of the World Health Organization, "humanity has the ability to make development sustainable—to ensure that it meets the needs of the present without compromising the ability of future generations to meet their own needs." This interpretation of sustainability has been adopted, modified, and applied in a variety of disciplines, such as marketing (Hult 2011; White et al. 2019), sociology (Marques and Almeida 2013), social psychology (Sachdeva, Jordan and Mazar 2015), and higher education (Armstrong et al. 2018).

Researchers employ various terms to represent sustainable behaviors. Examples include "pro-ecological behavior" (i.e., Ellen, 1994), "pro-environmental behavior" (i.e., Moser, 2015), "sustainable behaviors" (Griskevicius, Cantú and Vugt 2012), "sustainable consumer behavior" (i.e., White, Habib, & Hardisty, 2019), "socially conscious consumer" (i.e., Anderson & Cunningham, 1972; Webster Jr, 1975), "ecologically sound purchasing behavior" (Bell, Erwin and McLeod 1996), and "green behavior" (i.e., Newman, Gorlin, & Dhar, 2014). Each designation reflects a slightly different focus, this paper uses the terms interchangeably to capture a broader phenomenon of sustainable behaviors. As a general guide, the study uses White et al.'s (2019, p.24) definition of sustainable behaviors as "actions that result in decreases in adverse environmental impacts as well as decreased utilization of natural resources across the life cycle of the product, behavior, or service."

Sustainability in Marketing

Sustainability in marketing should focus on individual consumers and businesses for many reasons. First, individual consumer behavior differs from general consumer behavior (White et al. 2019). Whereas individual consumers choose products and services for their own wants and needs (Griskevicius et al. 2012; Solomon et al. 2014), sustainable consumption prioritizes the well-being of society and future generations (White et al. 2019). As such, strategies enlisted to encourage traditional consumption may not be as effective in the sustainability domain (Griskevicius et al. 2012).

Second, the marketing field can influence consumers toward sustainable consumption, as opposed to overconsumption (White et al. 2019). As Kilbourne et al. (1997, p. 5) state, "the ideology of consumption as the main means for achieving QOL [quality of life] is promoted by marketing." Marketing activities have long perpetuated overconsumption, producing deleterious environmental consequences (Csikszentmihalyi 2000; Kilbourne et al. 1997; Peattie and Peattie 2009; White et al. 2019). Figure 1 provides examples of these campaigns, including a Sunday newspapers ad stating, "Save 30 cents when you buy ANY 6 products" and a Facebook ad promising "free exclusive products on a monthly basis" to encourage people to buy more products. Such promotional messages often result in excessive waste and unused products, as shown in the Figure 1 (third photo).

Figure 1

Examples of traditional and online ads promoting overconsumption

Third, a cultural shift in consumer demand for green products is occurring (Nielsen 2021). Consumers increasingly demand that businesses incorporate sustainability into their business models, and they consider changing their own consumption habits to reduce environmental impacts (Nielsen 2021). Increasing consumer demand for green products often means increasing opportunities for businesses to capture more market share. Products with packaging that included a sustainability claim accounted for "16.6% of the markets in 2018, up from 14.3% in 2013, and delivered nearly $114 billion in sales, up 29% from 2013 … products marketed as sustainable grew 5.6 times faster than those that were not" (Whelan and Kronthal-Sacco 2019, para. 4). In 2019, the global market value of green packaging was estimated to be 178.6 billion U.S. dollars, and is projected to reach 246.3 billion U.S. dollars by 2025 (Statista 2022). However, although 60% of Americans want to behave more sustainably, they also want "added benefits, such as improving health or cost and environmental savings" (Nielsen 2018,

para. 7). Business support of this cultural shift though provision of such added benefits as well as education regarding the importance of sustainable consumption thus appears critical.

Fourth, businesses that adapt to support increased demand for green products are likely to reap long-term benefits (Closs, Speier and Meacham 2011; Seuring et al. 2008; White et al. 2019). From an internal operation perspective, Closs et al. (2011) asserts that adopting and implementing a holistic view of sustainable supply chains can enhance competitiveness. Seuring et al. (2008) advocate for incorporating environmental and social problems into supply chain management, allowing businesses to operate more efficiently. Numerous studies show that socially and environmentally responsible practices yield positive impacts on customers' attitude toward companies (White et al. 2019). For example, Chen (2010) finds that green branding, satisfaction, and trust are positively correlated with green brand equity. When brands introduce new green products, consumer attitude toward the brands improve (Olsen et al. 2014).

Historically, marketing-related sustainability studies are limited in number, gaining traction in the early 2000s. Chabowski, Mena, & Gonzalez-Padron (2011) examines 76,432 citations in 1,320 sustainability-focused articles from 36 journals over 51 years (1958–2008) and finds "a paucity of research on [sustainability-related topics] in premier marketing journals" (p. 3). Most marketing studies on firms' sustainability-related strategies focus on four key areas: behavior, stakeholder theory, corporate performance, and the triple bottom line (e.g., Chabowski et al., 2011, Closs et al., 2011; Hult, 2011; Newman, Gorlin, & Dhar, 2014). Individual-level sustainability began to gain popularity a few years later, reflecting a positive evolution of the consumer's viewpoint toward pro-environmental behaviors (see, for example, Baca-Motes, Brown, Gneezy, Keenan, & Nelson, 2012; Brough, Wilkie, Ma, Isaac, & Gal, 2016; Kidwell, Farmer, & Hardesty, 2013). To encourage sustainable behaviors (i.e., purchasing of green

products, energy conservation), multiple studies have investigated different strategies such as self-signaling and self-commitment (Baca-Motes et al. 2012), social norms (Goldstein, Cialdini and Griskevicius 2008), assertive messages (Kronrod, Grinstein and Wathieu 2012), concrete versus abstract advertising appeal (Yang et al. 2015), and moral motivations (Sachdeva et al. 2015). One largely overlooked area, however, is the impact of knowledge-enhancing interventions on sustainable behaviors. This dissertation aims to address this gap by examining the role of knowledge and, in particular, subjective knowledge in enhancing sustainable consumption behaviors.

Green Products

Green production is a broad category, according to McDonagh and Prothero (1997), with several dimensions, such as corporate and non-profit social responsiveness; traditional and new consumerism; conservation, sustainability, and ecological issues; and sociopolitical, equity, and fair trade concerns (Dangelico and Pontrandolfo 2010; McDonagh and Prothero 1997). Researchers have tried to narrow conceptions of green production by focusing on environmental impacts, such as using environmentally friendly materials and designs and proper disposal of materials (see review of definitions by Dangelico & Pontrandolfo 2010). While various characteristics may define green products (see Table 1), the dissertation uses the term green product, similar to previous studies: goods considered less harmful to the environment than traditional products (Speer 2011).

Table 1: Characteristics of Green Products

Authors	Characteristics of green products
Elkington and Hailes (1988)	• Does not endanger health of consumer or others • Causes no significant damage to the environment during manufacture, use, or disposal • Does not consume excessive energy during manufacture, use, and disposal • Does not cause unnecessary waste due to overpackaging, short useful life, and so on • Does not use any materials derived from threatened species or environments • Does not involve unnecessary use of or cruelty to animals • Does not adversely affect other countries, particularly developing economies
Simon (1992)	• Reduces raw material and has high recycled content • Uses non-polluting manufacturing methods and non-toxic materials • Minimizes or eliminates animal testing and • Has no impact on protected species • Consumes low energy during production, use, and disposal • Uses minimal or no packaging • Prioritizes reuse, refillability, and long useful life and capacity • Offers post-consumer collection and disassembly • Has remanufacturing capability
Schmidheiny (1992)	• Eliminates or replaces harmful products or ingredients • Substitutes environmentally preferred materials or processes • Decreases weight or volume • Produces concentrated product • Produces in bulk • Combines functions of more than one product • Produces fewer models or styles • Redesigns for more efficient use • Increases product life span • Reduces wasteful packaging • Designed for consumer repairability and reuse
Peattie (1995)	• Recyclable • Efficient • Has low emissions • Has low social impact and low impact on ecosystems • Promotes sustainable resource use • Allows sustainable waste and disposal methods

Note: See Dangelico and Pontrandolfo's (2010) "Review of the characteristics of green products" table (p. 1610) for additional authors and green product characteristics.

Barriers to Purchasing Green Products

Despite numerous surveys showing that consumers are willing to spend money on green products, an intention-behavioral gap persists (Chen et al., 2018; Vermeir & Verbeke, 2006). The decision to purchase environmentally friendly products is often viewed as a sacrifice (cost to self) rather than a pleasure (Ellen, 1994; Kennedy, 2019; White et al., 2019). Extensive research documents several barriers preventing pro-environmental behaviors (e.g., Dietz, Ostrom, & Stern, 2003; Kollmuss & Agyeman, 2002; Longo, Shankar, & Nuttall, 2017; Luchs and Kumar, 2017; White et al., 2019). These barriers include perceived higher prices (Aertsens et al. 2011; Benveniste 2019; Gleim et al. 2013; Lupberger 2017), product inferiority (Kennedy, 2019; Lin & Chang, 2012; Luchs et al., 2010; Luchs & Kumar, 2017; Lupberger, 2017; Pickett-Baker & Ozaki, 2008), and lack of availability (Aertsens et al. 2011; Arbuthnott 2009; Lupberger 2017; Vermeir and Verbeke 2006). Although cost, effectiveness, and availability barriers exist for some products, these concerns are not necessarily relevant to all green products. This dissertation evaluates two different green products to address some of these barrier issues.

Consumer Knowledge

Drawing on the theory of Planned Behavior, individuals may decide to engage in specific behaviors by evaluating their information (Fishbein 1963; Fishbein and Ajzen 2011). Consumer knowledge provides information and can significantly influence information processing which shapes one's belief (Gleim et al. 2013; Olson 1978; Shaw and Clarke 1999), which in turn influences attitudes and behaviors (Fishbein and Ajzen 2011; Mitchell and Olson 1981). Thus, consumer knowledge is an important determinant in consumer decision-making (Raju, Lonial and Glynn Mangold 1995). Changes in knowledge can impact consumer behaviors (Gleim et al. 2013; Jensen 2002). Traditionally, consumer knowledge has been viewed as a unidimensional

construct; that is, “consumers are assumed to have some amount of experience with or information about particular product” (Alba and Hutchinson 1987, 411). However, consumer knowledge is also theorized to have two major components, familiarity and expertise, where familiarity is the number of product-related experiences accumulated by the consumer and expertise is the ability to perform product-related tasks successfully (Alba and Hutchinson 1987)p. 123). Whereas familiarity accumulates naturally through advertisement exposure, information seeking, and talking to salespersons, expertise is “measured relative to a performance criterion and implies increased ability” (Hutchinson and Alba 2000, 123). Expertise “includes both the cognitive structures (e.g., beliefs about product attributes) and cognitive processes (e.g., decision rules for acting on those beliefs) required to perform product-related tasks successfully” (Alba and Hutchinson 1987, 411). Generally, increased product familiarity results in increased consumer expertise (Alba and Hutchinson 1987).

The impact of knowledge on consumer choice has been examined extensively in contexts related to product information search (e.g., Brucks, 1985), information processing (Alba and Hutchinson 1987), learning and organizing product information (Cowley & Mitchell, 2003), adopting new products (Moreau, Lehmann and Markman 2001; Wood and Lynch Jr 2002), and brand and product evaluation (Hong and Sternthal 2010; Palmatier et al. 2006; Rao and Monroe 1988). Bettman and Park (1980) find that individuals with moderate knowledge process more information than those with low or high levels of knowledge. Cowley and Mitchell (2003) report that low-level knowledge groups tend to purchase the same brands, regardless of use, whereas high-level knowledge groups think more deeply and subcategorize products according to use. More importantly, when evaluating products, low-knowledge consumers rely more on external attributes such as price, warranty, and non-functional attributes, while high-knowledge

consumers rely more on intrinsic attributes such as product functionality and design (Park and Lessig 1981).

Objective and Subjective Knowledge

Consumer knowledge is rarely complete, accurate, or without error (Hutchinson and Alba 2000). Even consumers who consider themselves knowledgeable may have inaccurate information (Hutchinson and Alba 2000). To measure the accuracy of consumer knowledge and to understand how knowledge impacts consumer decision making, researchers have examined two dimensions of the construct: objective and subjective knowledge (Brucks 1985; Feick, Park and Mothersbaugh 1992; Philippe and Ngobo 1999; Raju et al. 1995). Though related, these dimensions have clear conceptual and operational distinctions. Objective knowledge refers to what consumers *know* (i.e., what is actually stored in memory), whereas subjective knowledge reflects what consumers *think* they know (i.e., their perceived knowledge).

Strong correlations between subjective and objective knowledge are rarely observed (Cole et al. 1992; Hutchinson and Alba 2000). Moderate correlations between subjective and objective knowledge are associated with systematic biases, such as overconfidence or risk aversion (Carlson et al. 2008; Hutchinson and Alba 2000). A meta-analysis examining the correlation between subjective knowledge and objective knowledge finds a strong correlation between subjective and objective knowledge for goods versus services (e.g., financial services), public goods versus private goods, luxuries versus necessities, and material goods versus societal issues (Carlson et al. 2008).

Consumer Knowledge and Confidence

Subjective knowledge reflects individual confidence (Brucks 1985; Hutchinson and Alba 2000; Park and Lessig 1981). Ample research has found strong correlations between confidence

and subjective knowledge (e.g., Broniarczyk, Hutchinson, and Alba 1992; Hadar, Sood, and Fox 2013; Hutchinson and Alba 2000). This confidence may be influenced by personal ability and expertise, as well as other factors such as experiences, exposures, and beliefs (Bettman and Park 1980; Broniarczyk et al. 1992; Hutchinson and Alba 2000; Park, Mothersbaugh and Feick 1994). There is a strong positive relationship between level of familiarity and level of confidence (Park and Lessig 1981). This may explain why many consumers often think they know more than they actually do (Hutchinson and Alba 2000). Compared to highly familiar consumers, less familiar consumers express lower confidence in evaluating and selecting products (Feick et al. 1992; Park and Lessig 1981). Whereas overconfidence leads to insufficient information search, lack of confidence increases receptivity to persuasion (Feick et al. 1992; Wood and Lynch Jr 2002).

Impact of Subjective and Objective Knowledge on Consumer Choice

Raju et al. (1995) find that knowledge level (i.e., high versus low) and knowledge type (e.g., subjective versus objective) influence how consumers search for information and assess decision outcomes (e.g., perceptions of information needs, task complexity, confusion). In terms of information search, compared to the moderate objective knowledge group, high and low objective knowledge groups tend to search less for new information, producing an inverted U-curve pattern. However, there is no significant effect for subjective knowledge (Raju et al. 1995). In terms of decision outcomes, high subjective knowledge is associated with lower perceived confusion, and the belief that one is choosing the best available product option (Raju et al. 1995). Objective knowledge does not significantly affect decision outcomes (Raju et al. 1995).

Objective and subjective knowledge also differ in term of choosing a search strategy. High objective knowledge is associated with more inquiries about the product and with improved search efficiency (Brucks 1985). In contrast, subjective knowledge is positively correlated with

the tendency to request a holistic opinion from a seller, as opposed to asking about specific attributes (Brucks 1985). Furthermore, low subjective knowledge moderates the relationship between choice overload and willingness to purchase. In one study, those with low subjective knowledge are more willing to purchase wine when choosing from a large set of options than when choosing from small set of options (Hadar and Sood 2014).

Self-assessment surveys have typically been used to measure subjective knowledge, and quizzes can measure objective knowledge (Brucks 1985; Raju et al. 1995). Though quizzes and similar tools assess actual information stored, self-assessments may be more important for determining behaviors, as they measure consumers' perceptions (Brucks 1985; Park et al. 1994). Some studies of general consumer products focus on subjective knowledge effects (Brucks 1985; Hadar and Sood 2014; Hadar et al. 2013; Moorman et al. 2004; Wood and Lynch Jr 2002). However, no studies in the sustainability stream appear to have examined the role of subjective versus objective knowledge. Thus, this dissertation aims to test the applicability of subjective knowledge as a way to increase sustainable behaviors.

Objective Knowledge and Sustainable Behavior

Earlier research attributes less sustainable behaviors to a lack of environmental knowledge (Bray et al., 2011; Kennedy et al., 2009). However, given that 93% of the U.S. population uses the internet today (Perrin and Atske 2021), individuals are likely to have ample opportunities to access information and build knowledge related to sustainability. As such, the more salient issue may be the effectiveness of consumer knowledge in promoting pro-environmental behavior. Substantial research examines the relationship between environmental knowledge and its impact on sustainable behaviors, such as green purchasing (Bell et al. 1996), healthy diets and food labeling (Burton, Garretson and Velliquette 1999; Kanwar, Grund and

Olson 1990), and recycling and waste reduction (Ellen 1994; Longo et al. 2017; Mohr, Eroğlu and Ellen 1998).

Prior research generally reports positive relationships between consumer knowledge and pro-ecological behaviors, though effect sizes are mixed. For example, some researchers report a moderate correlation between environmental knowledge and pro-ecological behaviors (e.g., Al-Naqbi & Alshannag, 2018; Mobley, Vagias, & DeWard, 2010; Zsóka et al., 2013). Others find that the impact disappears when controlling for factors such as norms and efficacy (Heeren et al. 2016; Kollmuss and Agyeman 2002). Still others argue that environmental knowledge has a small effect on purchase intention for green products (Bartiaux 2008; Maichum, Parichatnon and Peng 2016; Pauw et al. 2015), compared to results showing that high consumer knowledge increases trust in and preferences for organic items (Raab and Grobe 2005; Yin et al. 2016). Overall, consumers seem to lack sufficient knowledge to understand the sustainability impact of the decisions they make (Decamps 2019; Miller, Munoz-Erickson and Redman 2011). These mixed results may be attributed to an overemphasis on raising objective knowledge levels (actual information stored in the memory) and proportionally less attention on how knowledge makes consumers feel (Armstrong et al. 2018; Findler et al. 2019). Previous research also finds a negative relationship between too much jargon/technical terms and subjective knowledge as they cause consumers to feel less knowledgeable and deter them from choosing desired outcomes (Hadar et al. 2013; Longo et al. 2017).

For example, Sulitest is a Sustainability Literacy Test focuses on measuring objective sustainability knowledge via literacy, testing, and assessments aimed at higher education. Sulitest emerged at the United Nations Conference on Sustainable Development in 2012 and since its launch in 2013, has gained popularity around the world. Over 120,000 people from more than

800 universities and organizations in 68 countries have taken the test (Decamps 2019). The key outcome measure is the test score (Tahtinen 2021). As of July 2021, the average score across 17 objective sustainability topics (e.g., climate action, life on land, zero hunger, affordable and clean energy) is 56% worldwide, with no percentage change from 2018 (Tahtinen 2021). See Figure 2.

Figure 2

Sulitest key outcomes: Average scores for 17 major sustainability topics of 56% in 2021

The Sulitest primarily focuses on the scientific nature of each of the sustainability topics. None of the Sulitest 17 topics assess consumer attitude toward sustainability. Thus, associations between test scores and sustainability attitude remain unclear. Despite extensive research on

objective knowledge and sustainable behavior, limited studies have focused on the impact of subjective knowledge on pro-environmental behaviors.

Subjective Knowledge and Sustainable Behavior

Carlson et al. (2008) find a negligible correlation of 0.36 versus 0.58 between subjective knowledge and objective knowledge related to sustainable consumption versus consumption of generic materials goods. Some evidence indicates that compared to objective knowledge, subjective knowledge is a better predictor of sustainable behaviors and is more strongly associated with various behaviors such as commitment to recycling, political action, and resource reduction (Ellen 1994); increased intention to purchase green products (Chen et al. 2018); and increased positive attitude toward environmentally sustainable food choices (Aertsens et al. 2011; Gámbaro, Ellis and Prieto 2013; House et al. 2004; Peschel et al. 2016; Pieniak et al. 2010). These findings are consistent with the notion that subjective knowledge is based on self-assessment, which may be more important than objective knowledge in determining behavior (Feick et al. 1992; Park et al. 1994).

Despite support for expanding sustainability research beyond objective knowledge (e.g., Arbuthnott 2009; Armstrong, Krasny, and Schuldt 2018; Ellen 1994; Findler et al. 2019; Kaiser and Fuhrer 2003; White, Habib, and Hardisty 2019; Worsley 2002), no studies that examine subjective knowledge to increase sustainable behaviors were identified in the sustainable domain. Almost all research exploring the relationship between pro-environmental behaviors and subjective knowledge uses self-assessment surveys as the only mechanism to explore the relationship. Thus, this research appears to be the first within the sustainability domain to use an experimental method to understand how subjective knowledge affects attitude toward the brand and intention to purchase green products.

Hedonic Versus Utilitarian Products

Strahilevitz and Myers (1998, p. 436) define hedonic and utilitarian consumption as follows:

> Utilitarian, goal-oriented consumption is motivated mainly by the desire to fill a basic need or accomplish a functional task (e.g., the consumption of a bottle of dishwashing liquid or a box of trash bags). In Western culture, such products are often labeled "practical" or "necessary." … Hedonic, pleasure-oriented consumption is motivated mainly by the desire for sensual pleasure, fantasy, and fun (e.g., the consumption of a hot fudge sundae or a week in the Bahamas). In Western culture, such products are often labeled "frivolous" or "decadent."

Utilitarian goods include personal computers, microwaves, and economy 4-door sedans (Hirschman & Holbrook, 1982); hedonic goods include designer clothes, jewelry, and sports cars (see Adaval, 2001; Dhar & Wertenbroch, 2000; Haws & Poynor, 2008; Kronrod, Grinstein, & Wathieu, 2011). However, defining products as utilitarian or hedonic is not always clear. Using a bi-dimensional scale, Crowley, Spangenberg, and Hughes (1992) demonstrate that products like vacation resorts, stereos, and cars can be rated high on both hedonic and utilitarian dimensions. Following Dhar and Wertenbroch (2000) and Okada (2005), this dissertation focuses on consumers' holistic perceptions, overall feelings, and experiences associated with a good as either hedonic or utilitarian and the impact of that perception on sustainable behaviors. In this way, it explores potential boundary conditions and enhances the external validity of hypothesized effects.

Extensive studies document distinct effects of the two constructs on consumer choice (e.g., Babin, Darden, and Griffin 1994; Batra and Ahtola 1991; Chitturi, Raghunathan, and Mahajan 2008; Choi et al. 2014; Dhar and Wertenbroch 2000; Kronrod, Grinstein, and Wathieu 2011; Okada 2005). For example, Dhar and Wertenbroch (2000) find that when decision is viewed as forfeiting a benefit, consumers prefer products with relatively higher hedonic dimension. On the contrary, when decision is viewed as acquiring a benefit, consumers prefer

products with relatively higher utilitarian dimension. Utilitarian products are shown to fulfill prevention goals and enhance consumer satisfaction, and hedonic products fulfill promotion goals and enhance consumer delight (Chitturi et al. 2008). When compared to the utilitarian product, individuals also rate a hedonic item more favorably when it is presented alone rather than alongside a utilitarian product, in which case consumers prefer the utilitarian product (Okada 2005).

One study examining viral marketing strategies reports that they work well for hedonic products (e.g., FarmVille) but are among the worst strategies for promoting utilitarian products (Schulze, Schöler and Skiera 2014). The product type is also found to moderate the relationship between pricing strategy and likelihood of purchasing products (Choi et al. 2014). For example, consumers are more likely to purchase a hedonic product (i.e., a newly released laptop) if the price ends in an odd number, such as $599 versus $600 (Choi et al. 2014).

Individuals also expend differing amounts of time and money to acquire hedonic versus utilitarian items. They will spend more time looking for a good deal on a hedonic good (Kivetz and Simonson 2002; Okada 2005), and they will spend more money on a utilitarian good (Okada 2005). Furthermore, hedonic products are often associated with visibility, such as fashion, restaurant dining, and high-end smartphones, whereas utilitarian goods are associated with private use, such as cleaning products (see Lin and Chang, 2012; Okada, 2005).

Considerable research examines the antecedent role of hedonic and utilitarian products on consumer purchasing decisions, but few studies examine the two constructs within the green product domain, with even fewer employing the lens of knowledge. A notable exception is Luchs and Kumar (2017), who examine consumers' willingness to trade off hedonic (i.e., aesthetic design) versus utilitarian (i.e., product performance) attributes in the purchase of

environmentally friendly products. They show that consumers are more (less) willing to give up aesthetics (performance) for a product with a higher (lower) sustainability rating. Consumers also view green utilitarian products (e.g., hand sanitizer, cleaning spray, mouthwash, and laundry detergent) as less effective compared to regular products, so they use more of the product to compensate (Lin and Chang 2012).

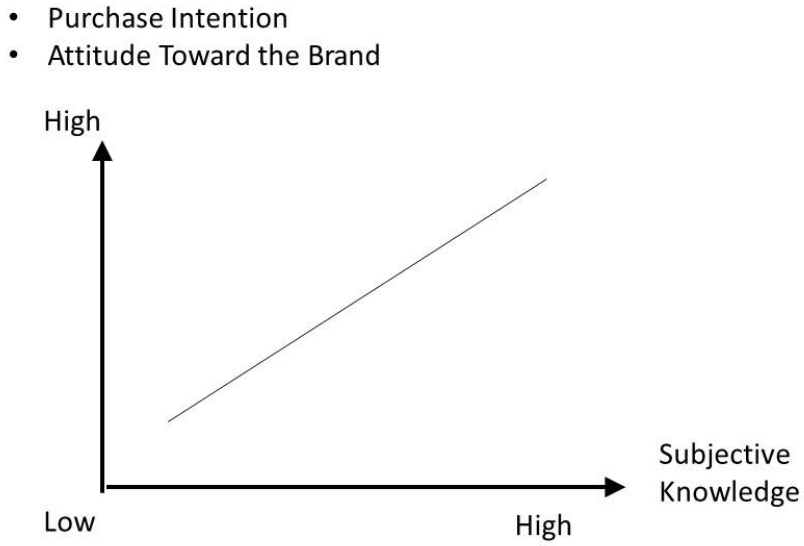
Several experiments have employed various utilitarian green products to represent environmentally-friendly products such as hand sanitizer (Lin and Chang 2012), detergents (Bell et al. 1996, 1996), and other cleaning products to measure product attitude and willingness to purchase (see for examples, Lin and Chang 2012; Schuhwerk and Lefkoff-Hagius 1995). Results are not surprising. In general, marketing research finds that participants with green product knowledge are more likely to demonstrate positive attitudes and intention to purchase green products (e.g., Aertsens et al. 2011; Bodur, Duval, and Grohmann 2015; Ellen 1994; Gámbaro, Ellis, and Prieto 2013; House et al. 2004; Liang et al. 2020; Olsen, Slotegraaf, and Chandukala 2014; Peschel et al. 2016; Pieniak, Aertsens, and Verbeke 2010; Suki 2016; Taufique and Vaithianathan 2018).

Drawing on Fishbein's theory of planned behavior and extensive empirical studies showing positive correlations between subjective knowledge, attitude, and intention to purchase green products, subjective knowledge is expected to have positive linear relationships with attitude toward the brand and intention to purchase utilitarian products.

> ***Hypothesis 1a***: Compared to consumers with low subjective knowledge, those with high subjective knowledge show a more favorable attitude toward the brand for utilitarian green products.
>
> ***Hypothesis 1b***: Compared to consumers with low subjective knowledge, those with high subjective knowledge have a stronger intention to purchase utilitarian green products.

Figure 3

Main Effect of the Expected Outcomes for Utilitarian Products



Despite extensive research on sustainable behaviors focusing on utilitarian products, limited research has explored the relationship between sustainable behaviors and hedonic products. Those that do, however, show mixed results. One study of individual hedonic values (e.g., pleasure, self-gratification) reports that a hedonistic person is less concerned about the environment than a utilitarian one (Steg et al. 2014). De Angelis, Adıgüzel, and Amatulli (2017) find that consumers are more likely to buy luxury green products when emphasizing the luxurious instead of green features. Participants associate luxury items with unsustainability. The product becomes less desirable when labeled as green (Beckham and Voyer 2014). However, one research study demonstrates that preferences for hedonic products and sustainability can be complementary (Lundblad and Davies 2016). For example, consumers who support sustainable fashion may experience increased self-esteem because their clothes promote positive self-expression while also protecting the environment and supporting human rights (Lundblad and Davies 2016).

While some researchers posit that hedonic products and sustainability can be complementary (Lundblad and Davies 2016), the present research argues that subjective knowledge is likely not a significant predictor of attitude and intention to purchase green hedonic products. The primary reason for purchasing hedonic products is to fulfill pleasurable consumption (Hirschman and Holbrook 1982). Making one feel more knowledgeable about their sustainability issues, in isolation, is not a significant factor in purchasing hedonic products (Chen et al. 2018). Note that consumers may have a positive consumption experience *after* the purchase, given additional product sustainability features (Tezer and Bodur 2020). Furthermore, consumers often need more justification beyond sustainability-related reasons to purchase hedonic products (Kivetz and Simonson 2002; Okada 2005). The justifications depend highly on individual's values and motivations (Jägel et al. 2012; Lundblad and Davies 2016). Previous research identifies a variety of justifications to purchasing (or not purchasing) hedonic products such as price (Jägel et al. 2012; Kivetz and Simonson 2002), aesthetic satisfaction, self-expression, group conformity (Kim et al. 1997), uniqueness (Jägel et al. 2012) and ethical obligations (Shaw and Shiu 2002). All these point to the conclusion that the relationships identified between subjective knowledge and attitude toward the brand and intention to purchase utilitarian are unlikely to hold for hedonic green products. Thus, for completeness, the second study includes a hedonic product treatment as a boundary condition but does not provide formal hypotheses as the relationships are not expected to be significant.

Perceived Consumer Effectiveness

Sustainability researchers find that subjective knowledge is positively associated with sustainable behaviors (Bell et al. 1996; Gámbaro et al. 2013; House et al. 2004; Mohr et al. 1998; Peschel et al. 2016). However, the underlying mechanism that explains this relationship remains

unclear. Ellen et al. (1991) defines perceived control effectiveness (PCE) as a "domain-specific belief that the efforts of an individual can make a difference in the solution to a problem" (p. 103). PCE is the self-evaluation of the impact of one's action (Ok Park and Sohn 2018). Within the green product context, PCE measures whether consumers feel that their consumption of environmentally friendly products creates positive environmental impacts (Allen 1982).

PCE differs from the self-efficacy construct. First, whereas PCE is associated with the domain of socially conscious consumption (Allen 1982; Scott 1977), self-efficacy is a general term covering beliefs about one's ability to execute behaviors to achieve specific levels of performance (Ajzen 2002; Bandura 1997, 2010), rather than the ability to influence outcomes (Antonetti and Maklan 2014). In other words, self-efficacy asks, "How easy or difficult is it to perform a particular task to achieve a goal?" and PCE asks, "Will my action contribute to the solution of achieving environmental sustainability?" Some studies characterize self-efficacy as an antecedent of PCE, and others find only a moderate correlation (Lee, Haley and Yang 2019). While distinct in focus, both are positively associated with environmentally conscious behaviors.

PCE also differs from "concern for the environment". Concern for the environment is defined as "an evaluation of, or an attitude towards facts, one's own behavior, or others' behavior with consequences for the environment" (Fransson and Gärling 1999, 370). These concerns do not necessarily translate directly into pro-ecological behaviors. However, consumers who strongly believe that environmentally conscious behaviors will result in positive outcomes are more likely to engage in such behaviors (Kim & Choi, 2005). Thus, concern for the environment construct remains an important determinant of sustainable behaviors (Brough et al. 2016; Kinnear, Taylor and Ahmed 1974; Lin and Chang 2012).

A similar construct to PCE is perceived competence. As self-efficacy is a significant predictor of attainment of further competencies, perceived competence is closely related to self-efficacy (Bandura 2010). Perceived competence is defined as “the extent to which a person feels he or she has the necessary attributes in order to succeed” (Kremer et al. 2011). Its measures are broadly applicable to various contexts. For example, in the exercise context, an example of a perceived competency measure is "I feel I can do even more challenging exercise." In a learning context and health context, a perceived competence measure may be "I feel confident in my ability to learn this material" and "I am capable of handling my diabetes," respectively (Williams and Deci 1996).

Overwhelming evidence indicates that PCE is a significant determinant of pro-ecological behaviors, such as recycling (Ellen 1994; Ellen et al. 1991), energy conservation (Kinnear et al. 1974), green product purchases (Balderjahn 1988; Ellen et al. 1991; Gleim et al. 2013; Kim and Choi 2005), and sustainable food consumption (Vermeir and Verbeke 2006). These findings are consistent with the Theory of Planned Behavior (Ajzen (1991), which asserts that perceived behavioral control accounts for significant variation in intention and behavior (Ajzen 1991; Armitage and Conner 2001). Similar to the impact of perceived control on behavior (Bandura 1997), consumers who believe they can make a difference in terms of sustainable outcomes (i.e., high PCE) are more likely to purchase green products (Balderjahn 1988).

While PCE has been extensively documented as a key predictor of pro-environmental behavior, limited research has investigated subjective knowledge as an antecedent to PCE. A few studies (e.g., (Ellen 1994; Ellen et al. 1991; Ok Park and Sohn 2018) report positive correlations between subjective knowledge and PCE, though causality has not been established. For example, one study finds a positive relationship between subjective knowledge and PCE, leading

to a higher willingness to buy carbon-labeled packaged product (Liang et al. 2020). Gleim et al. (2013) explain the relationship between knowledge and PCE that expertise has downstream impacts on sustainable behaviors. When level of expertise increases (such as realizing why green products may be costly, what makes them environmentally friendly, or where to purchase the products), an individual has a better understanding of the impact of his, her or their purchases, which increases PCE.

Turning back to subjective knowledge, high subjective knowledge about sustainability increases positive perceptions about what consumers think they know about sustainability, leading them to believe that they can create greater positive impacts on the environment (Gleim et al. 2013). Peschel et al. (2016)'s research supports the logic above as they find that high (versus low) subjective knowledge consumers care more about the impact of their purchases on the environment (i.e., intrinsic value) and become less sensitive to product price. Thus, when one thinks one is more knowledgeable about sustainability, one believes that his/her action can positively impact the environment which leads to higher PCE. Increased PCE leads to more positive attitude toward and intention to purchase utilitarian green products.

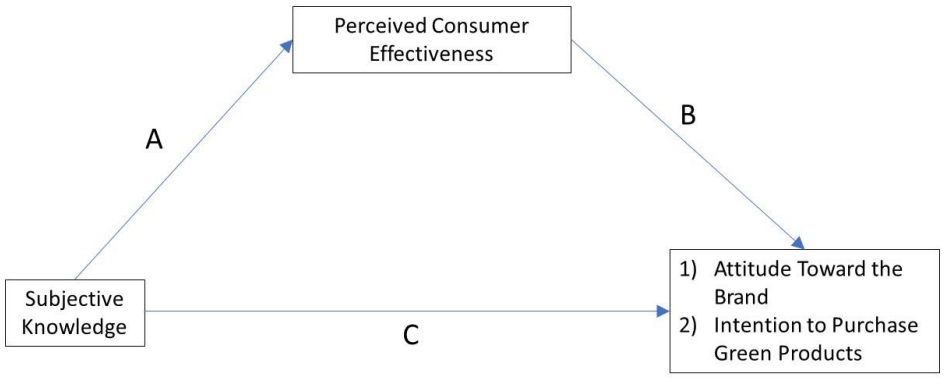
The current research hypothesizes an indirect mediation effect (i.e., PCE), though there may be many other hidden mediators (Zhao et al. 2010), which would be worth pursuing in future studies, e.g., confidence. Additionally, given that external cues such as knowledge can have a significant influence on how consumers evaluate information which leads to changes in consumer's beliefs and attitudes (Fishbein 1963; Gleim et al. 2013; Olson 1978), knowledge may also have a direct impact on green product attitude and purchase intention. Thus, H_2 identifies both direct and indirect mediation. The expected result is a commonly known type of complementary mediation (Zhao et al. 2010). Figure 4 illustrates the expected outcomes. Thus,

the dissertation hypothesizes the relationship between subjective knowledge and desired outcomes as follows:

> ***Hypothesis 2a***: Perceived consumer effectiveness mediates the positive relationship between subjective knowledge and brand attitude and intention to purchase utilitarian green products (paths A and B).
>
> ***Hypothesis 2b***: Subjective knowledge has a direct impact on brand attitude and intention to purchase utilitarian green products (path C).

Figure 4

Expected Outcome for Mediation Analysis for Utilitarian Green Products



Time Versus Money Trade-Offs

Next, this dissertation investigates the moderating effect of time versus money trade-offs as an individual difference construct on subjective knowledge. Time and money trade-offs are particularly relevant to sustainability-focused consumer behavior. First, these behaviors are often viewed as engaging in self-versus-other trade-offs (White et al. 2019), in which individuals prioritize the needs of society and environment over their personal wants. Purchasing green products is often associated with increased costs to the self (i.e., higher prices, more effort needed, inferior product quality) to benefit others (Luchs and Kumar 2017; White et al. 2019).

Therefore, embracing sustainable consumption requires commitment, an understanding of the long-term benefits (a time-oriented mindset), and willingness to pay higher prices (a money-oriented mindset). Second, given the existing key barriers, the decision to purchase green products is frequently related to a money-mindset as opposed to a time-mindset. People consider maximizing utility when purchasing green products but tend to overlook their long-term impact. Activating consumers' time-mindset thus may help narrow the intention-behavior gap. Third, time and money are powerful and ubiquitous resources in people's daily decisions (Zauberman and Lynch Jr 2005). Thus, a lack of accessibility to green products increases the resources needed to search for and purchase green products. Last, despite extensive research on time and money constructs, studies that examined trade-off effects in a sustainable marketing context were not found.

However, time and money constructs have received considerable attention across a wide variety of other disciplines. Whereas earlier research focuses on time (Graham 1981; Jacoby, Szybillo and Berning 1976) or money constructs (Mitchell & Mickel, 1999; Vohs, Mead, & Goode, 2006), more recent research explores how the two differ. Leclerc, Schmitt, and Dube (1995) find that both affect consumer perceptions and behavior differently. Because the value of time is not constant (Leclerc et al. 1995) and is more ambiguous and flexible, individuals cope with the loss of time (versus money) more positively (Okada & Hoch, 2004).

The impact of time versus money has been examined in other contexts. In the area of product evaluation, for example, activating time-related considerations augments personal connections to the product, resulting in more positive product attitude (Su & Gao, 2014). Activating money-related considerations, however, weakens product connections and leads to less favorable product attitude (Mogilner and Aaker 2009). In the area of charitable giving,

consumers with a time mindset (versus money mindset) donate more money (Liu and Aaker 2008; Zhou et al. 2018). Such findings suggest that consumers value time and money differently. Indeed, in research undertaken by Zauberman and Lynch (2005), consumers view time (versus money) as a more flexible resource, leading to differential discounts in the future outlay between the two constructs. Heuristic decision making thus is less frequent salient in the money-prime condition due to its tangible monetary value (Okada and Hoch 2004; Saini and Monga 2008).

In sum, money is viewed as a more concrete resource. Money changes an individual's motivation and primes a self-sufficient orientation—not depending on others and not wanting others to depend on them (Vohs et al. 2006). Vohs et al. (2006) find that activating conscious awareness of money makes people less helpful and less likely to engage in close interpersonal relationships. A study by Liu and Aaker (2008) finds differences in individuals' perceptions of donating time versus donating money. Thinking about time increases social and personal connections with others and motivates goals and beliefs to achieve personal and emotional well-being (Liu and Aaker 2008). The pursuit of happiness depends on both the self and connections with others (Vohs, Mead and Goode 2008). As such, a time mindset is associated with individuals spending more time with friends and family (Aaker et al. 2011; Mogilner 2010). Implicitly activating the time construct leads individuals to behave more ethically (Gino and Mogilner 2014).

In relation to product evaluation, a time-oriented person often thinks about personal experience with the product, whereas a money-oriented person often thinks about how to maximize utility (Liu and Aaker 2008; Mogilner 2010). Time considerations increase social and personal connections with others and motivate one to achieve personal and emotional wellbeing

(Liu and Aaker 2008). Money considerations promote a self-sufficient orientation that promotes independence and separateness (Vohs et al. 2006).

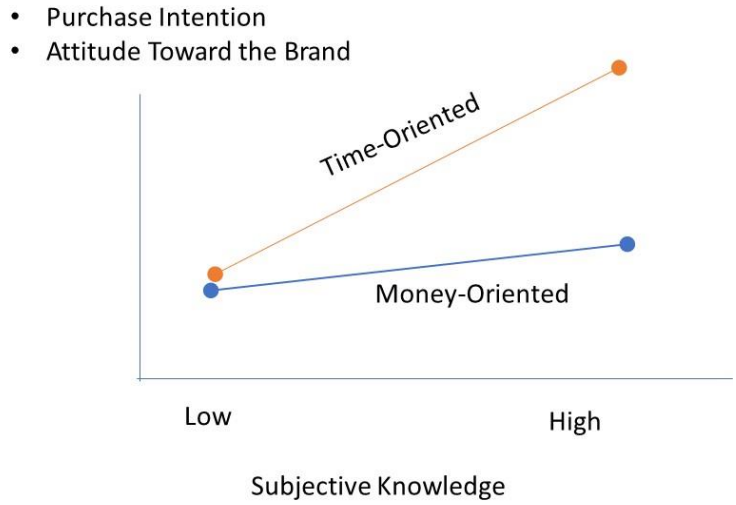
The dissertation proposes that the impact of subjective knowledge on attitude toward the brand and intention to purchase will be moderated by whether a person thinks about time versus money. The present research predicts that, given a time-oriented mindset, perceptions of high versus low subjective knowledge will have positively impact on brand attitude and purchase intention. However, high versus low subjective knowledge is not expected to differentially impact brand attitude and purchase intention among consumers with a money-oriented mindset. By definition, high subjective knowledge positively impacts consumer perceptions of their sustainability knowledge, leading to the belief that their actions can have a positive impact on the environment (Gleim et al. 2013). High subjective knowledge participants who have a time-oriented mindset may more think about their future personal and emotional well-being, which may prime the belief that taking actions to safeguard the environment will improve their own and their loved ones' well-being. Therefore, it is likely that the interaction between time orientation and high subjective knowledge will enhance positive brand attitude and purchase intention for a green product. On the other hand, consumers with a money-oriented mindset are more likely to consider cost and other more immediate issues and for this reason, high versus low subjective knowledge is not predicted to have an effect on brand attitude and purchase intention.

> ***Hypothesis 3****:* The level of subjective knowledge will positively affect attitude toward the brand and intention to purchase green utilitarian products among time-oriented consumers, but not money-oriented consumers.

Figure 5 illustrates the expected outcomes.

Figure 5

Expected Outcome for the Moderating Effect between Subjective Knowledge and Time versus Money Construct



Construal Level

Next, this dissertation investigates the interaction effect between high- versus low-construal level and subjective knowledge. Construal level explains how psychological distance influences individuals' thoughts and behaviors (Trope and Liberman 2010; Trope et al. 2007). Psychological distance impacts the way we think about events, ideas, objects in terms of high versus low level, which influences how abstract versus concrete those thoughts are (Trope and Liberman 2010).

The central premise of construal level theory is that people mentally construe objects that are psychologically near in terms of low-level, detailed, and contextualized features, whereas, at a distance people construe the same objects or events in terms of high-level, abstract, and stable characteristics (Trope et al. 2007). The more psychologically distant an event is, the more it will be mentally construed at higher levels of abstraction (Trope et al. 2007). For example, when planning a vacation for next year (distance future), one may think about the abstract,

decontextualized features of the vacation, such as having fun and spending time with family and friends. On the other hand, when planning that same vacation that will occur very soon (proximity), one may think more about concrete details of the actions, including purchasing a plane ticket and booking a hotel room. In sum, previous research identifies the differences between high versus low construal levels as follows:

- High-level construal refers to abstract thoughts. When thinking on the high construal level, people think more holistic, the bigger picture, and omit the details. People focus on the central idea, the gist of the situation.
- Low-level construal refers to concreate thoughts. When thinking about low-level construal, people think more concretely and are associated with psychological proximity. They focus on the present in greater detail. At the low level, people focus on the peripheral features, which are less essential to the overall gist of the situation or object (Trope and Liberman 2011).

Based on the construal-level theory that a person can view an action from different levels of abstractions (Liberman and Trope 1998; White et al. 2011), the action of buying green products can be viewed as a low-level construal (such as how the product helps prevent specific environmental damage) or a high-level construal (such as why the product is good for the overall environment). The dissertation proposes that the effect of subjective knowledge on brand attitude and purchase intention will be moderated by the consumer's construal level. It hypothesizes that consumers with high (low) subjective knowledge will have more positive attitude toward the brand and higher purchase intentions for a green utilitarian product when presented with a high (low) level construal promotional message.

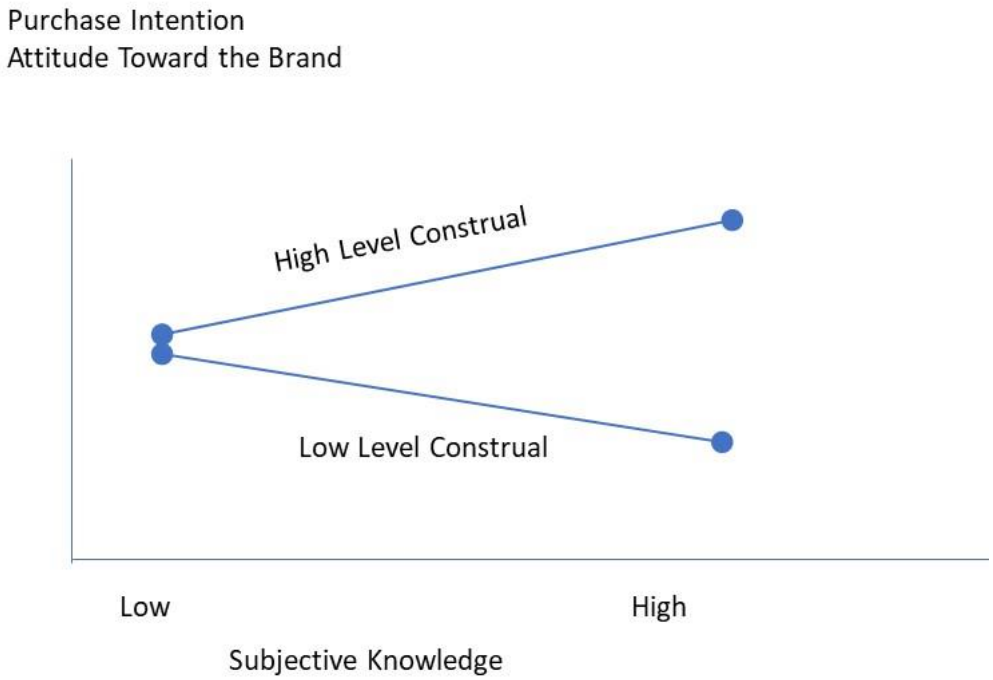
Previous studies posit that high subjective knowledge positively correlates with holistic opinions about a product (Brucks 1985) and beliefs that one chooses the best available product option (Raju et al. 1995). Regarding construal level, a promotional message that focuses on why the product benefits the environment in general frames the message with a holistic perspective (Brucks 1985) and implies that the product is a positive choice overall. Both high subjective knowledge and high-level construal share similar abstract-level thinking. As such, high subjective knowledge should pair well with a high-level construal mindset. In contrast, consumers with low subjective knowledge, i.e., consumers who believe they have lower levels of objective sustainability knowledge, are likely to respond more positively in terms of attitude and purchase intention to low-level construal messaging about how the product works as such messaging increases concrete understanding of the product. Thus, this dissertation hypothesizes that low subjective knowledge and low-level construal, both of which involve more concrete types of thinking, should enable a congruent processing style. In contrast, high subjective knowledge better matches with high-level construal given that both share a similar level of abstraction and, as a result, should also enable a congruent processing style. The effect of processing fluency which results when there is congruency between information and extant mindset enhances positive affect, hence evaluations (e.g., Reczek, Trudel and White 2018; White, MacDonnell and Dahl 2011)

Thus, H4 states:

> ***Hypothesis 4****:* A high level (low level) of subjective knowledge will positively affect attitude toward the brand and intention to purchase utilitarian green products among high level (low level) construal consumers.

Figure 6

Expected Outcome for the Moderating Effect between Subjective Knowledge and Construal Level



Methods

Pre-Test: Testing the Effectiveness of the Main Effect Manipulations

A pre-test was conducted to ensure that the subjective knowledge manipulation worked as expected. Of the 80 participants recruited from Mechanical Turk (MTurk) to participate in the survey pre-test, 3 were excluded due to incomplete responses, leaving 77 (65% male, age range 25–55 years old) for analysis. Participants completed the sustainability assessment quiz and were asked to rate its perceived difficulty. The pre-test and all the subsequent studies use SPSS software for statistical analysis.

Sustainability Quiz

The 12-question quiz contained multiple choice and true/false questions on topics related to carbon loading, pollution reduction, and the circular economy. Most questions were adapted from National Geographic, Energy.org, and EPA.gov (see

Appendix 2

Reliability Coefficients (Cronbach's alphas)

Measures	Study 1	Study 2	Study 3a	Study 3b	Study 4	Study 5
Subjective knowledge	.83	.74	.84	.80	.84	.70
Attitude toward the brand	.91	.95	.96	.94	.96	.87
Attitude toward the ad (used in study 1)	.75	N/A	N/A	N/A	N/A	N/A
Attitude toward the ad (used in studies 2-5)	N/A	.96	.96	.95	.96	.91
Perceived consumer effectiveness	.84	.81	N/A	N/A	N/A	N/A
Green consumption value	.93	.94	.93	.94	.94	.90
Green trust	.89	.95	N/A	N/A	N/A	N/A

Appendix 3

Sustainability Quiz). Upon completing the quiz, participants were randomly assigned to a high or low subjective knowledge group.

False Feedback Manipulations

To manipulate subjective knowledge conditions in the two groups, participants received false feedback indicating that they performed either better or worse than the average test taker (e.g., see Hadar & Sood, 2014; Moorman, Diehl, Brinberg, & Kidwell, 2004; Wood & Lynch Jr., 2002). Specifically, participants received false feedback indicating they scored 25% above (high subjective knowledge, Figure 6) or 25% below (low subjective knowledge, Figure 7) the average score.

Figure 6

False Feedback Manipulation: High Subjective Knowledge

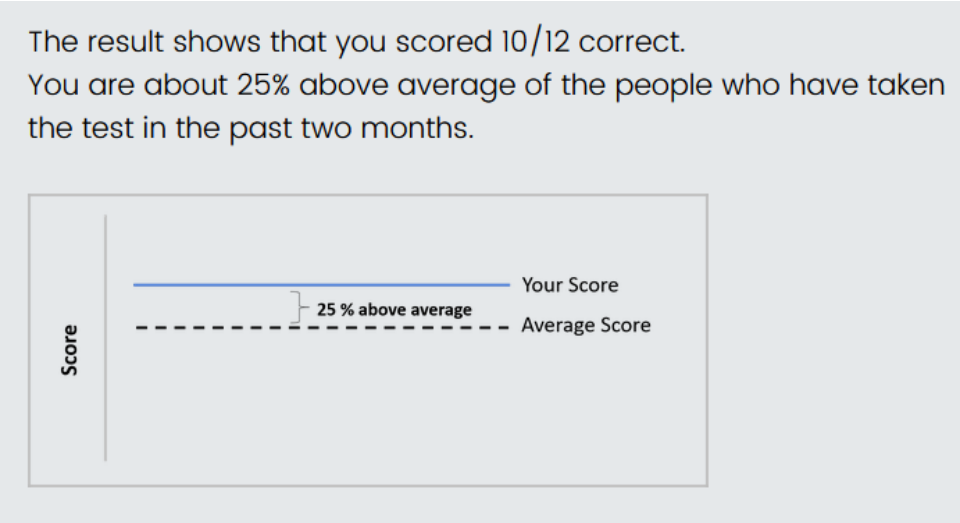
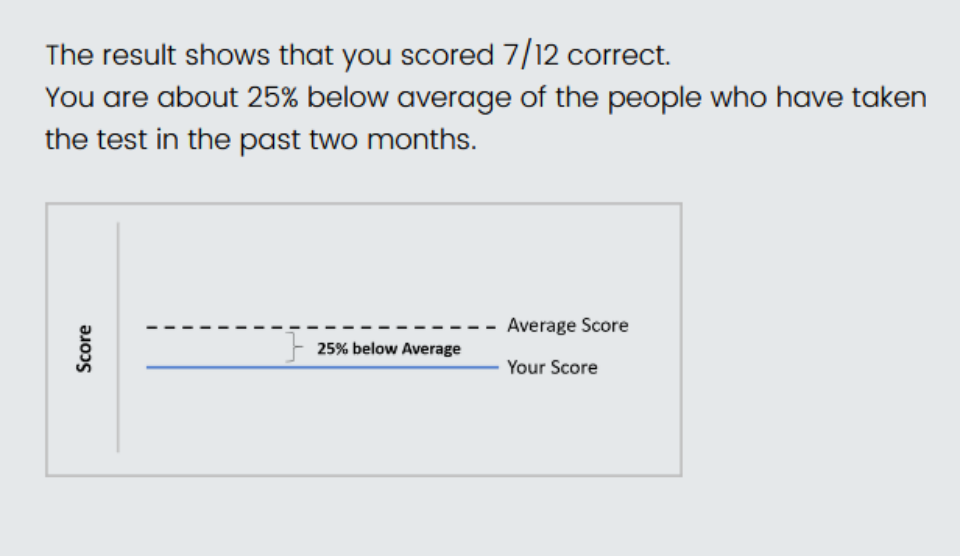


Figure 7

False Feedback Manipulation: Low Subjective Knowledge



Measures in the pre-test include perceived difficulty of the test, subjective knowledge level, objective knowledge as measured by the sustainability quiz score, and an open-ended question to detect any demand artifacts.

Pre-Test Results

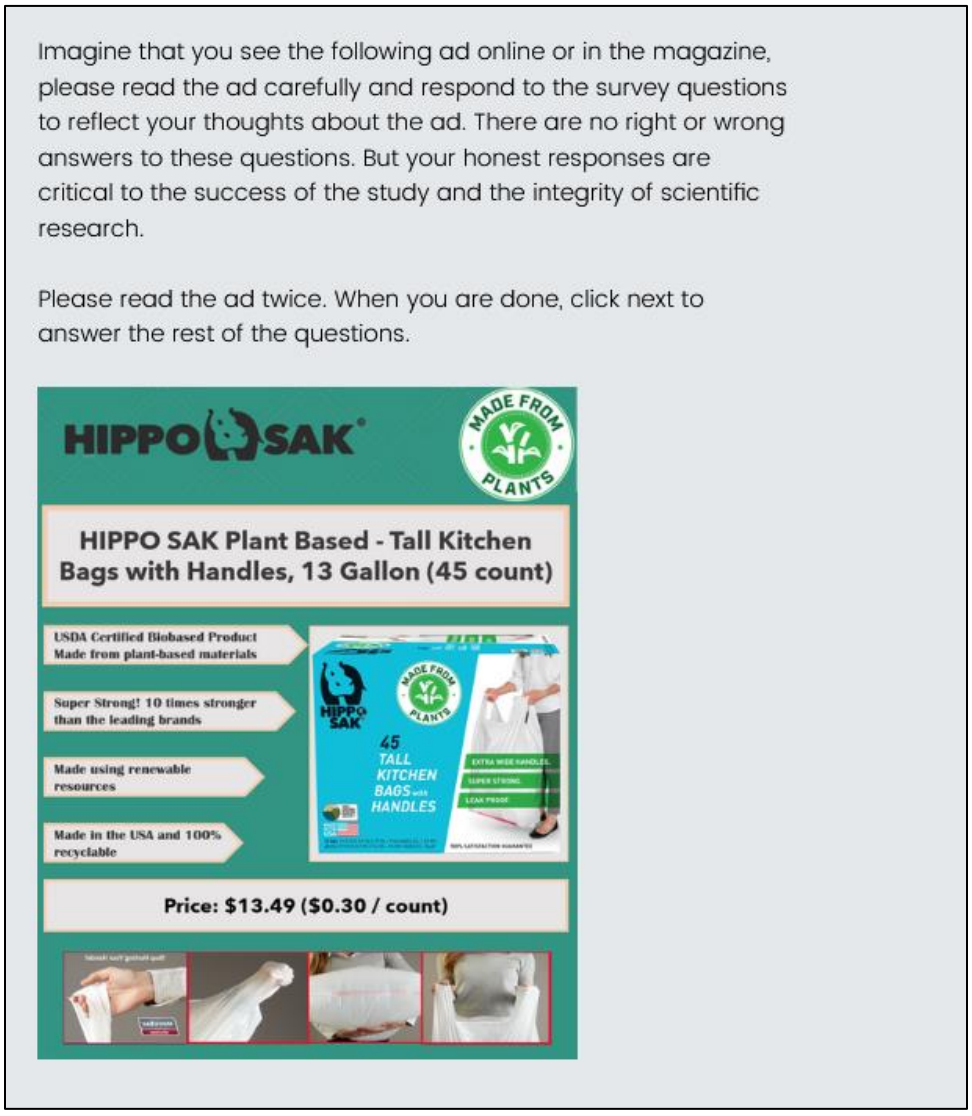
Using a 5-point scale ranging from 1 (very easy) to 5 (very difficult), most pre-test participants rated the difficulty of the sustainability assessment quiz as average (M=3.10, SD=.94). Manipulations worked as expected. Participants assigned to the high subjective knowledge condition (N=41) felt they were more knowledgeable about sustainability (M=4.35, SD=.71), compared to those in the low subjective knowledge group (M=2.88, SD=1.26; t(75)=6.25, $p< .001$). Objective knowledge did not differ between groups (t(75)=.18, $p>.10$), and no correlation was found between subjective and objective knowledge (r(77)=.05, $p>.10$).

Study 1: Testing the Hypothesized Main Effect with a Utilitarian Product and Identifying Perceived Consumer Effectiveness as a Mediator

Study 1 tested the main effect of hypothesis 1 predicting that high (low) subjective knowledge will lead to a more (less) positive attitude toward the brand (H_{1a}) and stronger (weaker) purchase intention for (H_{1b}) a utilitarian green product. For this study, the utilitarian product was a Hippo Sak plant-based kitchen trash bag. These trash bags are made from sugar cane instead of petroleum and 100% recyclable, which reduces the consumer's carbon footprint (Hippo Sak 2018). They also are certified as biobased by the U.S. Department of Agriculture Bio Program (2016), which means they use renewable biological (e.g., plant, marine, and forestry) materials and less CO2. After completing the sustainability quiz, participants were randomized to the high or low subjective knowledge group using the previously described false feedback method. After viewing the product ad (see Figure 8 for an example screen), all participants completed the remaining survey questions.

Figure 8

Study 1 Utilitarian Product Ad: Hippo Sak Trash Bags



Study 1 Measures

A 2-item, 5-point subjective knowledge scale served a "How knowledgeable do you feel about sustainability?"; 1= not knowledgeable at all to 5 = very knowledgeable;s a manipulation check after subjects received false feedback on their quiz scores (e.g., Hadar, Sood and Fox 2013).

Dependent variables were measured using previously published scales:

- Adapted from Mogilner and Aaker (2009), a 3-item, 6-point semantic differential scale of unfavorable/favorable, bad/good, and negative/positive was used to measure attitude toward the brand.
- Adapted from Hartmann and Apaolaza-Ibáñez (2012), a 1-item, 5-point scale with response ranging from 1=very unlikely to 5=very likely, was used to measure intention to purchase (i.e., "I intend to purchase the [product] in the future.")

The survey also included exploratory constructs, for which hypotheses were not offered:

- Adapted from Hadar, Sood and Fox (2013), a 1-item, 5-point scale (i.e., "How confident are you in your knowledge about sustainability?"; 1=not at all confident to 5=very confident) gauged participants' confidence about their knowledge.
- For study 1, a 2-item, 7-point Likert scale (e.g., "I found the advertisement to be favorable") measured attitude toward the ad (MacKenzie, Lutz and Belch 1986).

For the mediation analysis, a 6-item, 7-point Likert scale measured perceived control effectiveness (e.g., "I can protect the environment by buying products that are friendly to the environment"; Kim and Choi 2005).

In addition, several covariate/control constructs were measured as follows:

- A 6-item, 7-point Likert scale (e.g., "I would describe myself as environmentally responsible") tapped green consumption value (Haws, Winterich and Naylor 2014).
- Adapted from Park and Lessig (1981), a 1-item, 5-point scale (i.e., "How familiar are you with the [brand]?"; 1=not familiar at all to 5=very familiar.) gauged familiarity with the brand.

- Green trust was measured using a 5-item, 5-point scale (e.g., "I feel that this product's environmental reputation is generally reliable"; 1=definitely not to 5=definitely yes; Chen 2010).

Last, subjects answered demographic questions regarding gender, age, income, and race (see Appendix 1
List of Measures).

Study 1 Results

Study 1 Analysis 1: Main Effect

For study 1, 125 participants (64.5% male, age 25–55) were recruited from MTurk, and all data were included. The manipulation worked as expected. Those in the high subjective knowledge group (N=58) felt more knowledgeable (M=3.34, SD=.62) and more confident (M=3.29, SD=.99) than those in the low subjective knowledge group (N=67, M_{subj}=2.58, SD_{subj}=.99; $t_{subj}(123)$=5.21, p<.001, d_{subj}=.83, α_{subj}=.86; M_{conf}=2.70, SD_{conf}=1.24; $t_{conf}(123)$=2.96, p=.004, d_{conf}=.51). The two treatment groups did not differ (all p values >.10) in terms of objective knowledge score (t(123)=.88), familiarity with the brand (t(123)=.22), green trust (t(123)=.39, α=.89), and green consumption value (t(123) =-.03, α =.93), indicating a well-randomized sample. Appendix 2 reports the reliability coefficients for scales used in all studies. No correlation between subjective and objective knowledge (r(125)=.01, p>.10) was observed.

As hypothesized, the high subjective knowledge treatment group expressed more positive attitude toward the brand (M=5.21, SD=.83, α=.91) and stronger purchase intentions (M=3.79, SD=1.12) than those in the low subjective knowledge group (M_{AttP}=4.74, SD_{AttP}=1.20; $t_{AttP}(123)$=2.54, p<.05, d=.47; M_{PurInt}=3.30, SD_{PurInt}=1.34; $t_{PurInt}(123)$=2.25, p<.05, d=.39).

Though exploratory, results also revealed that subjective knowledge had a positive impact on attitude toward the advertisement. Participants in the high subjective knowledge condition felt more positive about the ad (M =6.04, SD=.73), compared to those in the low subjective knowledge group (M=5.45, SD=1.12; t(123)=3.47, p<0.001, d=.60, $\alpha = 0.75$).

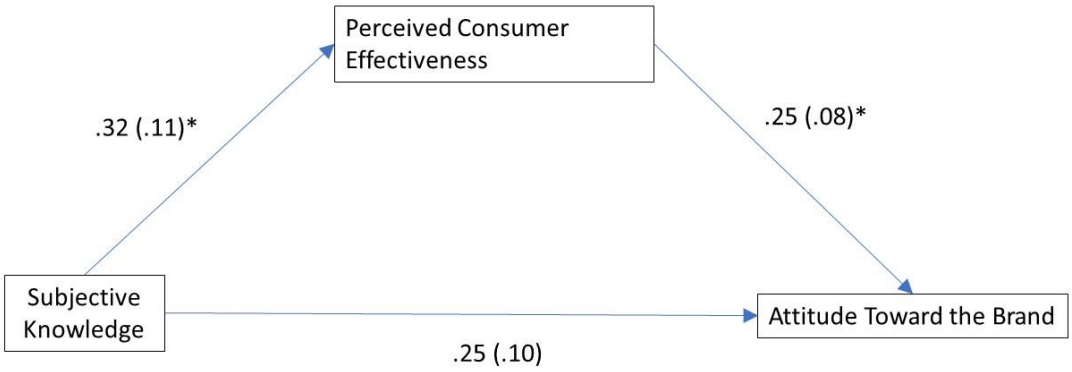
Study 1 Analysis 2: Perceived Consumer Effectiveness as a Mediator

Hayes' (2013) Model 4 (5,000 bootstrap sampling) was used to examine the mediation model. The independent variable was subjective knowledge (continuous variable), the mediator was perceived consumer effectiveness, and the dependent variables were attitude toward the brand and purchase intention for the product. Dropping the reversed item from the original scale increased Cronbach's alpha from .38 to .84. For this reason, a 4-item scale measured PCE rather than the original 5-item scale. Based on Zhao et al. (2010), 5,000 bootstrap samples were applied at the 95% confidence interval (CI). Regarding the indirect effect of subjective knowledge on attitude toward the brand, the pathway from subjective knowledge to attitude toward the brand through perceived consumer effectiveness showed a significant indirect effect (β=.08, SE=.05, 95% CI [.01, .19], α=.84). The direct effect of subjective knowledge on attitude toward the brand was not significant (β=.17, SE=.10, p>.05); thus, the result corresponds to Zhao et al.'s (2010) indirect-only mediation.

Figure 9

Figure 9

Perceived Consumer Effectiveness Mediates the Relationship Between Subjective Knowledge and Attitude Toward the Brand

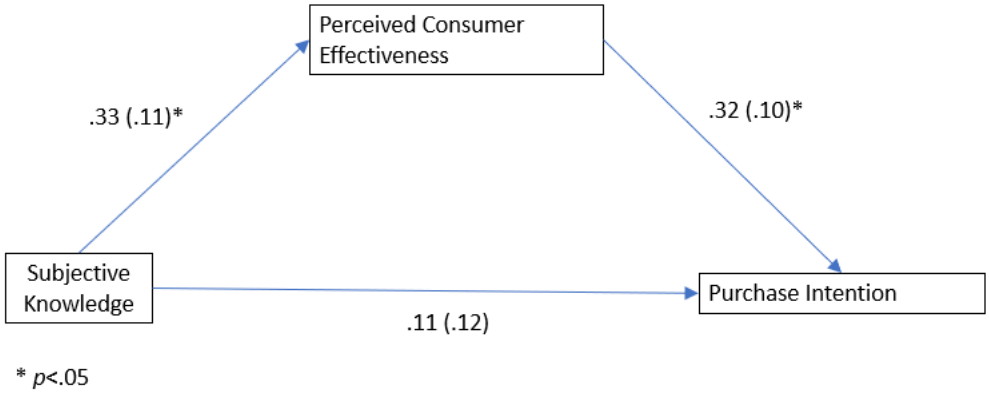


* $p<.05$

Regarding purchase intention, the pathway from subjective knowledge to purchase intention through PCE also showed a significant indirect effect (β=0.10, SE=0.05, 95% CI [.02, .21]). No direct effect was found ($p>.10$), corresponding to Zhao et al.'s (2010) indirect-only mediation (see Figure 10

Figure 10

Perceived Consumer Effectiveness Mediates the Relationship Between Subjective Knowledge and Purchase Intention



* $p<.05$

Study 1 Discussion

As hypothesized, high (low) subjective knowledge was associated with positive (negative) attitude toward the brand and high (low) purchase intentions. The indirect-only mediation result was somewhat surprising, indicating that subjective knowledge alone may not alter the outcome; rather, subjective knowledge is required to activate PCE. An increase in subjective knowledge led to higher perceived consumer effectiveness, which in turn resulted in improved brand attitudes and purchase intentions. Given the indirect-only mediation result, H_{2a} is thus supported, and H_{2b} is not.

Study 2: Examining the Hedonic Green Product Category as a Potential Boundary Condition

Study 2 examined the hedonic green product category as a boundary condition to the relationships between subjective knowledge and attitude toward the brand and intention to purchase. Given the previously described differences between utilitarian and hedonic products, a boundary condition is expected for the hedonic as opposed to utilitarian green products. Study 2 replicated study 1's method with the inclusion of a hedonic product, the Evolution Hoodie (Unlike study 1, study 2 expected null relationships between subjective knowledge and both attitude toward the brand and purchase intention. and Figure 12) as a treatment. The study also used the same measures as in study 1, except for the measurement of attitude toward the ad. To improve the scale reliability, study 2 employed a 3-item, 6-point semantic differential scale (unfavorable/favorable, unappealing/appealing, and negative/positive; Nan 2008) See Appendix 1 for a list of measures.

Evolution Hoodies were launched as a Kickstarter project in March 2019. They are made from recycled coffee grounds and plastic bottles and cost about $89 retail. The marketing

campaign showcased the hoodie's 20 features and associated the clothing item with hedonistic feelings of fun, adventurousness, and pleasure. Furthermore, Evolution Hoodie promotes sustainable practices in a $3 trillion industry that has been criticized for not committing enough to environmental efforts (Radocchia 2018) despite contributing to 10% of global CO2 emissions (Conca 2015). Unlike study 1, study 2 expected null relationships between subjective knowledge and both attitude toward the brand and purchase intention.

Figure 11

Evolution Hoodie ad

Source picture: Kickstarter, 2019; Soloviy, 2019

Figure 12

Hedonic Product Ad and Scenario: Evolution Hoodie

Imagine that you see the following ad online or in a magazine. Please also imagine that you are looking for a hoodie for yourself or as a gift for a relative or friend.

Read the ad carefully and respond to the survey questions to reflect your thoughts about the ad. There are no right or wrong answers to these questions, but your honest responses are critical to the success of the study and the integrity of scientific research.

Please read the ad twice. When you are done, click next to answer the rest of the questions

Study 2 Results

Of 101 participants, half were male, aged 25 to 55 years. All were recruited from MTurk, and all data were included. The manipulation worked as expected. Those in the high subjective knowledge group (N=52) felt they were more knowledgeable (M=3.16, SD=.61) and more confident (M=2.83, SD=.90) about sustainability than those in the low subjective knowledge

group (N=49, M_{subj}=2.35, SD_{subj}=.62; $t_{sub}(99)$=6.67, d_{subj}=1.11, p<0.001; M_{conf}=2.43, SD_{conf}=.94; $t_{conf}(99)$=2.18, d_{confi}=.43, p<.05). No significant difference (all p values >.10) was found between the two treatments in terms of objective knowledge score (t(99)=-.70), green trust (t(99)=-.92), green consumption value (t(99)=.47), attitude toward the ad (t(99)=-1.02), and willingness to purchase (t(99)=.08), indicating effective randomization across treatments. No correlation was found between subjective and objective knowledge (p>.10). As expected, attitude and intention to purchase did not differ between the high versus low subjective knowledge treatments (all p>0.10). Given the non-significant relationship, the mediation analysis was not examined here.

Study 2 Discussion

As previously stated, prior research indicates that consumers often feel guilty when purchasing hedonic products and thus may need an additional justification to express a positive attitude and purchase intention (Kivetz and Simonson 2002; Okada 2005). In addition, consumers buy hedonic products more for pleasure and less for sustainability purposes (Beckham and Voyer 2014; Chitturi et al. 2008). However, the alternative explanation of the non-significant results may be due to price as a confounding variable, given that the "green" hoodie in this study is more expensive than typical hoodies. Using a word cloud data visualizing tool (www.freewordcloudgenerator.com) to analyze comments from subjects, the word "expensive" was most frequently mentioned (see Figure 13). Future studies thus might consider creating a promotional message without a price.

Figure 13

Key Words Generated from Participants' Feedback

Study 3a: Moderation Effects Between Subjective Knowledge and Self-Identified Time Versus Money Construct

Study 3b investigated whether the main effect for subjective knowledge on attitude toward the brand and purchase intention for a utilitarian product found in study 1 was moderated by a self-identified time versus money orientation. In particular, H_3 hypothesizes that the main effects for high versus low subjective knowledge will be amplified among consumers who identify more with a time versus money orientation (due to higher access to future scenarios and consequences), but it will be reduced or completely nullified for consumers who identify more with a money versus time orientation (due to higher access to short-term perspectives and situational cues, such as higher expenses or lower effectiveness associated with green products).

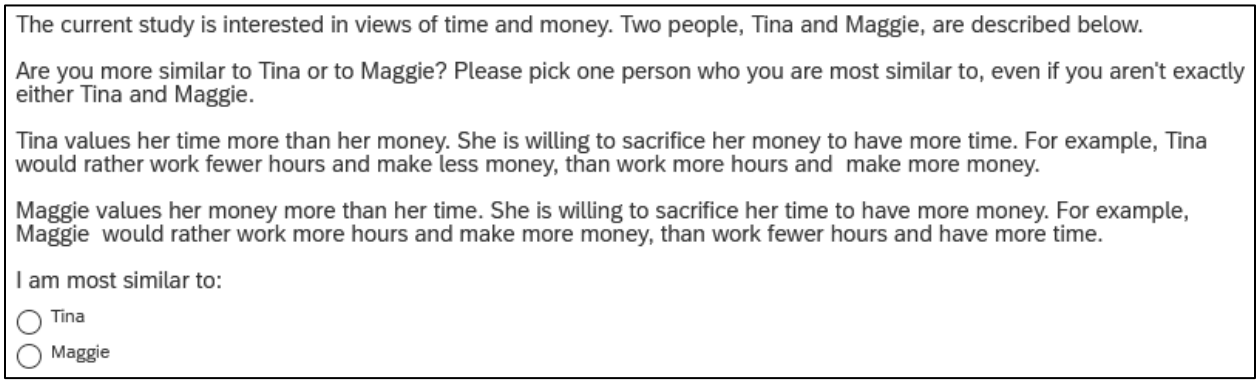
Study 3a Method

Study 3a employed a 2 (subjective knowledge: high versus low) × 2 (mindset: time versus money) between-subjects design. The study first measured whether participants were more time-oriented or money-oriented by inviting them to read a scenario (Figure 14) and asking

whether they identified more with the time salience or money salience character (Hershfield, Mogilner and Barnea 2016; Whillans, Weidman and Dunn 2016).

Figure 14

Time versus Money Scenario



To manipulate subjective knowledge, subjects first answered the sustainability quiz and received false feedback indicating they had low versus high subjective knowledge, as previously described. To increase the study's external validity, instead of the Hippo Sak trash bags used in study 1, study 3a used an ecofriendly all-purpose cleaner. After answering manipulation check questions, participants then viewed the ad (Figure 15) and answered the remaining survey questions using the same measures as in study 2.

Figure 15

A Utilitarian Product Ad for All-Purpose Cleaners

Study 3a Results

Of 97 participants, 59% were female, aged 25 to 55 years. All were recruited via TurkPrime, and all were included in the analysis. Fifty-eight participants (60%) self-identified as time-oriented, and the remaining 39 (40%) self-identified as money-oriented. The manipulation check indicated that the subjective knowledge treatment was successful. Participants in the high subjective knowledge condition (N=49) felt more knowledgeable (M=3.17, SD=.79) and more confident (M=3.27, SD=1.10) about sustainability, compared to those in the low subjective knowledge condition (N=48, M_{sub}=2.06, SD_{sub}=.82; $t_{sub}(95)$=-6.79, d_{subj}=-1.14; M_{conf} =2.17, SD_{conf}=1.14; $t_{conf}(95)$=-4.85, d_{conf}=.89, *ps*<.001). However, the ANOVA analysis failed to reveal a significant main effect or interaction effect between subjective knowledge and time versus

money orientation on attitude toward the brand, attitude toward the ad or intention to purchase (all *ps*>.10), after controlling for green consumption value. Thus, H_3 was not supported.

Study 3a Discussion

The non-significant result for the main effect is surprising, given the results from study 1, and may relate to complications due to internal validity issues associated with the self-identified measure of time versus money. Manipulating independent variables, as opposed to a self-identifying approach, is a better method to establish causality (Spencer, Zanna and Fong 2005) and demonstrate psychological processes (Jerit et al. 2016; Spencer et al. 2005). Furthermore, a well-designed manipulation can improve power via increased effect size (Sawyer and Ball 1981). Study 3a's analysis indicated a minimal effect size of .008 and observed power of .137, partially due to an uneven and small sample size of 97 subjects. Study 3b thus manipulated the time versus money construct with a larger sample size to validate the result.

Study 3b: Moderation Effects Between Subjective Knowledge and the Manipulated Time Versus Money Construct

Study 3b followed the same procedures and measures as study 3a except that the time versus money construct was manipulated using a word descrambling task (see Mogilner and Aaker 2009; Vohs, Mead, and Goode 2006). Each group was assigned a list containing 20 sets of five jumbled words, half of which contained relevant construct-related words and the other half filler words. Participants were asked to rearrange the words into sentences using four of the five words. For example, the list for the money-prime condition included the word phrase "right up price the is," which can be rearranged into "the price is right," and the time-prime condition list included the phrase "right up time the is," which can be rephrased into "the time is right" (see Figure 16 and Figure 17).

Figure 16

Time Mindset Priming Condition Word Descrambling Task

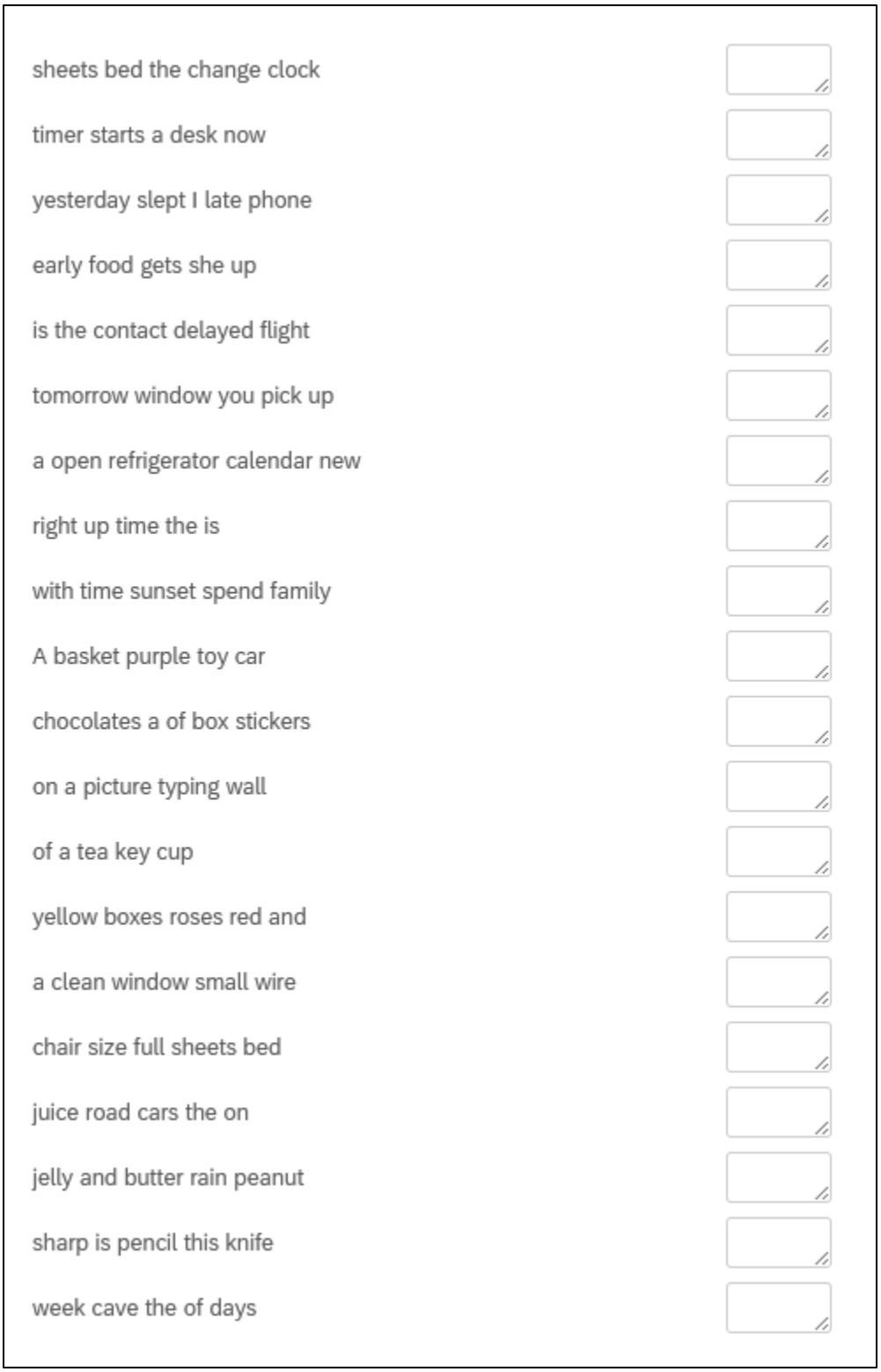
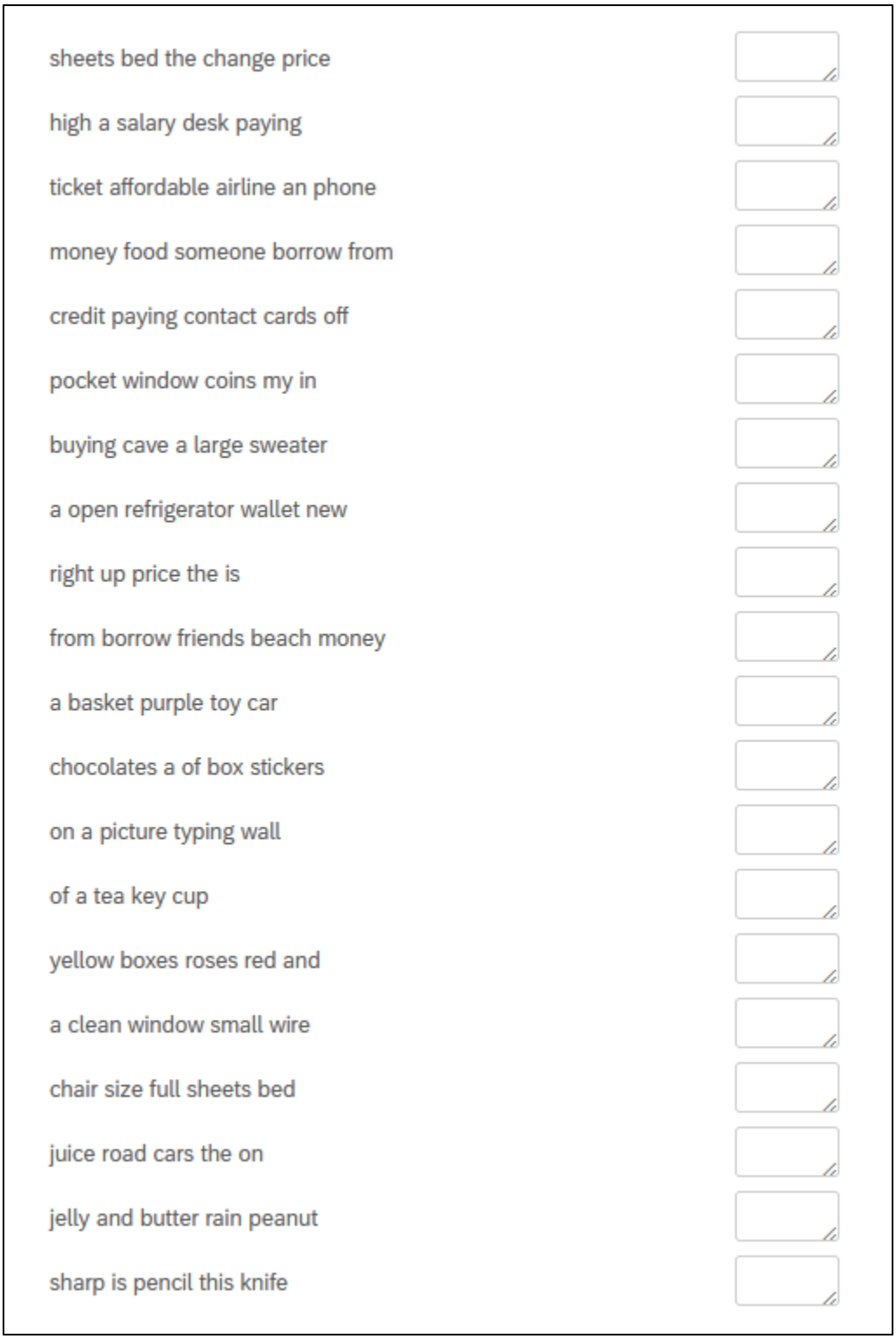


Figure 17

Money Mindset Priming Condition Word Descrambling Task



Study 3b Results

Of 166 participants, 58% were female, aged 25–55 years. All were recruited via TurkPrime and included in the analysis. The manipulation check for subjective knowledge indicated successful treatment. Participants in the high subjective knowledge condition (N=81) felt more knowledgeable about sustainability (M=3.21, SD=.73, α=.80), compared to those in the low subjective knowledge condition (N=85, M=2.20, SD=.69); t(164)=-9.17, d=1.16, p<0.001. Confidence also differed between the two treatments, such that the high subjective knowledge participants felt more confident about their sustainability knowledge (M=3.07, SD=.97), compared to the low subjective knowledge participants (M = 2.19, SD=.97; t(164)=-5.89, d=.83, p<0.001). Those in the high subjective knowledge group also expressed higher green consumption value (M=4.37, SD=.71, α=.88) than those in the low subjective knowledge condition (M=4.13, SD=.80; t(164)=-2.12, d=.32, p<0.05).

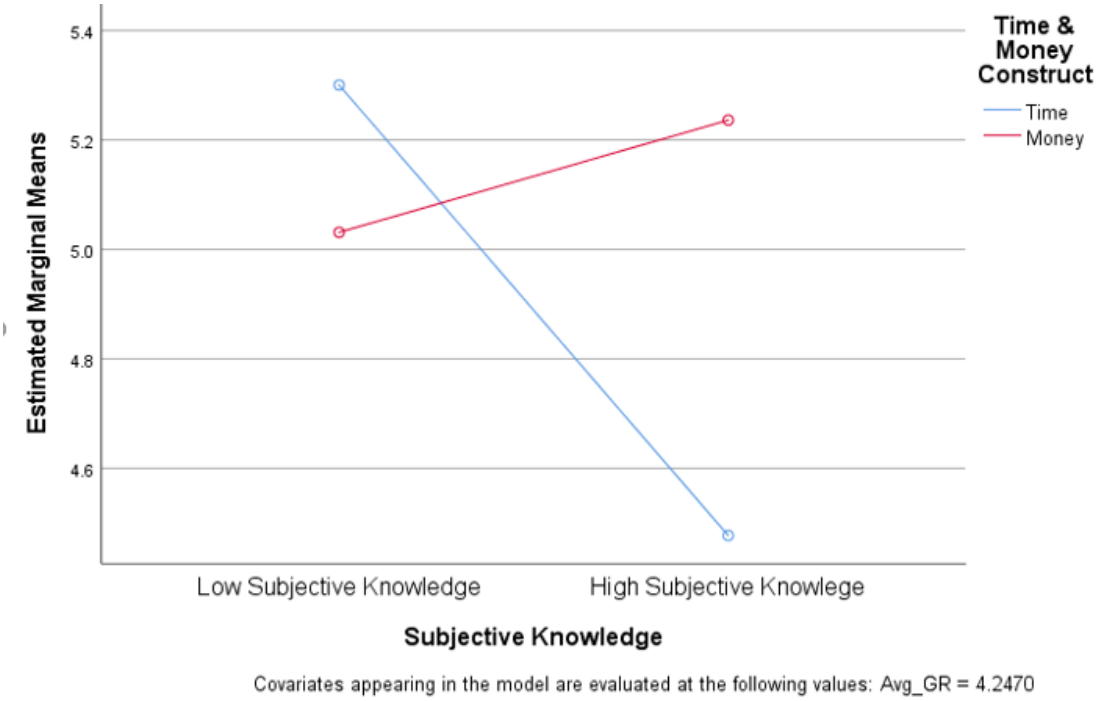
The manipulation check indicated a successful treatment in terms of the time and money construct. Using a 5-point bipolar scale (1=time, 5=money), more participants in the time condition believed their word descrambling task contained time-related phases (M=1.82, SD=.84), compared to those in the money condition (M=4.55, SD=1.62; t(164)=-13.02, d=1.42, p<0.001).

The full factorial 2-way analysis of variance did not reveal significant main or interaction effects between subjective knowledge and the time versus money construct for attitude toward the brand (p>.10), after controlling for green consumption value. However, the analysis revealed a surprisingly significant interaction effect on purchase intention, F (1, 161)=5.60, p=.02, η^2_p=.03. Participants in the high subjective knowledge group expressed higher intentions to purchase when thinking about money (M=5.24, SD=.22), rather than time (M=4.48, SD=.22).

The effect size of .034 had an observed power of .652 (study 3a had an effect size of .008 with .137 observed power). No contrast effect was found for the time/money mindset under low subjective knowledge condition. Notably, the time (as opposed to the money) mindset interacted with subjective knowledge. **Figure 18** illustrates the results.

Figure 18

Interaction Effect between Subjective Knowledge and the Time versus Money Construct on Purchase Intentions



Study 3b Discussion

The analysis revealed an interaction effect between subjective knowledge and the time versus money mindset for purchase intention but not for attitude toward the brand. This result is somewhat surprising given that a positive attitude often, though not always, enhances the willingness to purchase. It is possible that participants may not have had a favorable attitude but felt obligated to purchase an environmentally friendly product. The result is consistent with Shaw and Shiu's (2002) finding that consumers can feel obligated to engage in ethical

consumption. Surprisingly, the high subjective knowledge participants expressed lower intentions to purchase when thinking about time. This result contradicts hypothesis H_3 that high subjective knowledge should pair well with the time mindset. Thus, H_3 is not supported.

The time versus money construct (i.e., thinking about time increases social and personal connections with others and with products and increases motivation to achieve personal and emotional well-being) did not produce the intended result. One possible explanation is that when consumers with high subjective knowledge were reminded of time and its importance, they considered it a waste of time to learn about a product through an ad and would prefer to do the research on their own. Alternatively, a prior research finds that a money-oriented person often thinks about ways to maximize utility (Liu and Aaker 2008) which is more closely related to the goal of consuming utilitarian (versus hedonic) products (Strahilevitz and Myers 1998). Furthermore, consumers are willing to spend more for utilitarian products (Okada 2005) while high subjective knowledge participants are shown to be less sensitive to product price (Peschel et al. 2016); thus, money-orientation may better match with high subjective knowledge for utilitarian (as opposed to hedonic) green products. Future studies should try to examine the impact of time on sustainable behaviors and explore different ways to manipulate the time construct, such as using a future versus present time orientation. Extensive research has found that time orientation differences impact consumer behaviors (e.g., Bergadaa 1990; Jacoby, Szybillo, and Berning 1976). Study 3b manipulated time using word descrambling tasks that contained past, future, and present time-related phrases. See Figure 16.

Study 4: Moderation Effects Between Subjective Knowledge and Construal Level

Study 4 investigated whether the results in study 1 (effects of subjective knowledge on attitude toward the brand and purchase intention for a utilitarian product) are moderated by

consumers' construal level. Specifically, study 4 tested hypothesis H_4, which predicts that consumers with low (high) subjective knowledge will have more positive attitude toward the brand and higher purchase intention for a green utilitarian product when presented with a low (high) level construal promotional message.

Study 4 Method

Study 4 employed a 2 (subjective knowledge: high versus low) × 2 (construal level: high versus low) between-subjects design. Similar to studies 1 and 2, subjects first completed the sustainability quiz and received false performance feedback indicating low versus high subjective knowledge. Then, subjects viewed either a low- or high-level construal promotional message and answered the remaining survey questions using the same measures as in study 2 and 3. Figure 19 and Figure 20 show the ads for the Grab Green cleaning spray using "why" versus "how" messaging to activate a high versus low construal level. The "why" message has been shown to activate a high construal level/abstract mindset, whereas the "how" message has been shown to activate a low construal level/concrete mindset (for example, see Freitas, Gollwitzer, and Trope 2004; Liberman and Trope 1998; Vallacher and Wegner 1987).

Figure 19

Low-Level Construal Ad (How the Product Works)

Figure 20

High-Level Construal Ad (Why the Product is Superior)

Study 4 Results

Of 151 participants, 46.4% were female, aged 25–55. All were recruited from TurkPrime and included in the analysis. The manipulation worked as expected. For subjective knowledge, participants in the high subjective knowledge condition (N=76) felt more knowledgeable about sustainability (M=3.28, SD=.71), compared to those in the low subjective knowledge condition (N=75, M=2.32, SD=.82, t(149)=7.65, d=-1.06, p<.001). Turning to construal level, participants who viewed the low-level construal ad (N=74) more strongly agreed with the statement "the Grab Green all-purpose cleaner ad you saw emphasizes *how* the product works" (M=3.88, SD=1.36), compared to those who viewed the high-level construal ad (N=77, M=2.92. SD=1.27; t(149)=-4.47, d=.69 p<.001).

The full factorial 2-way analysis of variance indicated a main effect of construal level on purchase intention ($F(1, 147)=12.97$, $p=.01$, $\eta_p^2= 0.044$), such that those who saw the high-level construal promotional message expressed a stronger likelihood to purchase Grab Green (M=5.38, SD=1.23) than those who saw the low-level construal message (M=4.80, SD=1.66; $t(149)=2.43$, $p<.05$, d=.39). Similar results were observed for attitude toward the ad ($F(1, 147)=.15$, $p=.03$, $\eta_p^2=0.030$). Those in the high-level versus low-level construal condition expressed more positive attitudes toward the ad (M=5.14, SD=.94 versus M=4.76, SD=1.14; $t(149)=2.17$, $p<.05$, d=.35). However, the message's construal level did not significantly impact attitude toward the brand ($p>.14$). In addition, neither the main effect of subjective knowledge ($p >.56$) nor the interaction effect between subjective knowledge and construal level ($p>.44$) were statistically significant.

Study 4 Discussion

No interaction relationship was found between subjective knowledge and construal level. The study revealed that participants who saw the high-level versus low-level construal promotional message expressed more positive attitudes toward the ad and higher intentions to purchase. This result is similar to previous research showing that an abstract construal message increases support of sustainable products (Reczek et al. 2018). However, it is unclear why the high construal level message did not result in more positive attitudes toward the brand. Another study replicating this result is needed to validate the outcome.

Study 5: Impact of Construal Level on Subjective Knowledge

Given the main effect of construal levels found in study 4, study 5 explored the potential role of construal level as an antecedent to subjective knowledge. The relationship between these two factors may occur for several reasons. First, high-level construal and high subjective knowledge both share similar main effects: positive attitudes toward the ad and increased

purchase intentions. Second, construal levels have been extensively studied and shown to be powerful intervention tools impacting consumers' evaluations and behaviors in various domains (see Trope and Liberman 2010). Idealistic values are more related to high-level construal, whereas pragmatics concerns are more related to low-level construal (Kivetz and Tyler 2007). Thus, those with high construal value may evaluate products from a more idealistic and holistic viewpoint (e.g., environmentally friendly products help reduce damage to the environment) and be less concerned about peripheral or pragmatic details (e.g., price). These individuals may increase their subjective knowledge because they view products from a wide perspective of overall functionality while omitting specific product attributes (Brucks 1985; Park and Lessig 1981). On the contrary, individuals with a low construal level may focus more on details and be unsure about their product knowledge, resulting in low subjective knowledge. Thus, the hypothesis is as follows:

> ***Hypothesis 5****:* A high (low) construal level leads to a high (low) level of subjective knowledge related to sustainability.

Study 5 Method

For study 5, 99 participants were recruited from TurkPrime (44% men, 25–55 years old). Participants were randomized into a high-level or low-level promotional message construal group using the ads from study 4. Unlike the first four studies, study 5 did not manipulate but directly measured subjective knowledge after viewing either a high- or low-level construal ad. Subjects were asked to rate their level of sustainability knowledge and complete the remaining survey questions that were used in study 4.

Study 5 Results

The construal level manipulation worked as expected. A higher percentage of participants in the low-level construal message group agreed that the Grab Green cleaner ad emphasized

concrete attributes regarding how the product worked (N=48, M=3.71, SD=1,49), compared to those in the high-level construal group (N=51, M=2.71, SD=1.39), t(97)=-3.47, d= -.67 $p<.001$). Self-identified subjective knowledge level (modeled as a measured dependent variable as opposed to an independent two-level factor in all other studies) was unaffected by the high- versus low-level construal prime contained in the two different promotional messages ($p>.10$). Thus, construal level did not appear to influence subjective knowledge. In addition, the significant main effect of message construal level identified in study 4 was not replicated in terms of attitude toward the ad or purchase intention. Furthermore, as in study 4, construal level did not have a significant effect on attitude toward the brand.

Study 5 Discussion

Though seemingly inconsistent with study 4's significant main effect results, it is important to note the differing procedures in the two studies. Study 4 participants did not have to answer any questions about sustainability, nor did they have to think about the topic before viewing the ad. Thus, the scenario may not have felt as real as the others. Future research could examine this relationship using stronger construal level manipulations (Sawyer and Ball 1981).

Summary of Results from Studies 1 - 5

The dissertation begins with a pre-test to ensure that the subjective knowledge manipulations work as expected. Participants completed the sustainability assessment quiz and then rated the quiz's perceived difficulty. Next, four experiments are used to test the hypotheses.

In study 1, analysis 1 examines H_{1a} and H_{1b}, which center on the main effects of subjective knowledge on a utilitarian green product. Analysis 2 of study 1 examines H_{2a} and H_{2b}, the mediation of perceived consumer effectiveness. The main dependent variables are attitude toward the brand and purchase intention. The results of analysis 1 demonstrate that compared

with participants with low subjective knowledge, those with high subjective knowledge express more positive attitude toward the brand and stronger purchase intention for utilitarian green products (H_{1a} and H_{1b}). Analysis 2 results reveal the indirect-only mediation in which perceived consumer effectiveness mediates the relationship between subjective knowledge and the primary dependent variables ($H2_a$). Study 2 identifies the hedonic product category as a potential boundary condition for the relationships found in study 1. Consistent with expectations, there are no significant relationships between subjective knowledge and attitude and intention to purchase hedonic products.

Building on these findings, study 3a examines the potential moderating effects of the self-identified time versus money orientation on the utilitarian product. The analysis does not show a significant main effect of subjective knowledge or interaction effect between subjective knowledge and time versus money construct. Given the non-significant results, the current research modifies study 3a (becomes study 3b) by manipulating as opposed to using a self-identified time versus money orientation and by increasing sample size. The result reveals a significant interaction effect such that high subjective knowledge participants express lower intention to purchase when thinking about time. An additional experiment (study 4) is conducted beyond the original dissertation plan to explore high versus low construal level as a potential alternative moderator (H_4). However, neither significant main effect of subjective knowledge or interaction effect between subjective knowledge and construal level is observed. However, main effect of the construal level, such that high-level construal participants show increased positive attitude toward the ad and purchase intention, but not attitude toward the brand, is identified.

Given the construal main effect results from study 4, study 5 is added to further investigate the role of construal level as an antecedent to subjective knowledge (H_5). The results

indicate no relationship between construal level and subjective knowledge. See Table 2 below for a summary of the studies.

Table 2: *Summary of Studies*

Studies	Expected Results	Actual Results
Study 1, Analysis 1	Main effect of subjective knowledge on attitude toward the brand (H_{1a}) and purchase intention (H_{1b}) for utilitarian green products	H_{1a} and H_{1b} are supported.
Study 1, Analysis 2	Mediation Analysis: indirect through PCE (H_{2a}) and direct (H_{2b}) mediation for both attitude toward the brand and intention to purchase utilitarian green products	H_{2a} is supported, indirect-only mediation.
Study 2	No significant relationships between subjective knowledge and attitude and intention to purchase hedonic products. Mediation effect for hedonic green products is not examined.	As expected, no significant relationships are observed.
Study 3a	Interaction effect between self-identified time versus money orientation and subjective knowledge (H_3)	H_3 is not supported
Study 3b	Interaction effect between manipulated time versus money orientation and subjective knowledge (H_3)	H_3 is not supported, *but significant interaction is found*.
Study 4	Interaction effect between construal level and subjective knowledge (H_4)	H_4 is not supported, but a high-level construal main effect is found.
Study 5	Construal as an antecedent to subjective knowledge (H_5)	H_5 is not supported.

General Discussion

The overall objective of the dissertation was to understand the impact of subjective knowledge on attitude toward the brand and intention to purchase green products. In study 1, informing consumers that they had higher scores on an objective environmental knowledge test enhanced their beliefs that they had relatively high levels of knowledge about these issues (i.e., high subjective knowledge) and hence, resulted in more positive attitude toward the brand (H_{1a}) and stronger intention to purchase (H_{1b}) a green utilitarian product (i.e., compostable kitchen trash bags), compared with consumers who were told they had lower than average scores on the same test and therefore believed they were less knowledgeable. However, as expected, in the case of a hedonic green product (i.e., a hoodie made from recycled materials) in study 2, higher subjective knowledge did not appear to impact either attitude toward the brand or intention to purchase. Returning to study 1, the results demonstrated that PCE mediated the relationship between subjective knowledge and both attitude toward the brand and intention to purchase the utilitarian product (H_{2a}). However, the direct relationship was not observed (H_{2b}). This mediation analysis was not performed for the hedonic product, given the non-significant relationship.

In study 3a, a different utilitarian product was used (i.e., non-toxic, all-purpose cleaner), and a potential moderator (self-identified time versus money orientation) of the subjective knowledge main effect found in study 1 was tested. Statistically significant moderating effects were not found between subjective knowledge and a self-identified time versus money orientation (H_3). Study 3b improved on study 3a by manipulating the construct and increasing the sample size. A moderating effect was found between subjective knowledge and manipulated time versus money orientation such that high subjective knowledge consumers expressed lower intention to purchase utilitarian products when reminded of time orientation. In study 4, no

moderating effect was found between subjective knowledge and a primed high versus low level construal (H_4). Thus, H_4 was not supported. Last, in study 5, the construal level appeared to have no impact on subjective knowledge, thus H_5 was not supported.

Overall, the results imply that subjective knowledge was a significant factor in facilitating attitudes and behaviors related to purchasing ecofriendly products. However, these results did not justify the conclusion that objective knowledge is not important in driving green behaviors. The results suggest that in addition to raising awareness through objective knowledge, consumers need to feel more confident about their sustainability knowledge to strengthen their beliefs in their ability to create positive environmental impacts.

Theoretical Implications of the Research

The current research built on previous literature to distinguish subjective knowledge from other types of knowledge and demonstrate its impacts on sustainable behavior. The results showed that consumers with high subjective knowledge were more likely to support environmentally friendly products. A large body of marketing research has examined the role of knowledge and its impact on consumer decisions related to durable products, such as electronic devices, non-durables, and household items (e.g., Brucks, 1985; Hong & Sternthal, 2010; Hutchinson & Alba, 2000; Wood & Lynch Jr, 2002). However, the decision-making process for green or sustainable products has received less attention. Thus, the current research focused on subjective knowledge and included both utilitarian and hedonic green products. The results revealed that the hedonic green product category might serve as a boundary condition for the relationships between subjective knowledge and attitude toward the brand and intention to purchase. The current research also extended the time versus money construct literature by examining the moderating role of time and its impact on subjective knowledge.

In addition, much of the previous research about subjective knowledge concerning sustainable behaviors has examined this relationship using self-assessments of subjective knowledge, without experimentally manipulating the construct (e.g., Aertsens, Mondelaers, Verbeke, Buysse, & Van Huylenbroeck, 2011; Pieniak et al., 2010). This dissertation shows how subjective knowledge could be activated to promote desirable outcomes. It also highlights the role of perceived consumer effectiveness as an indirect-only mediator between subjective knowledge and desirable results.

Managerial Implications

The focal finding was that subjective knowledge could be activated, leading to increased support of sustainable products. The results also showed that perceived consumer effectiveness mediated the relationship between subjective knowledge and desirable outcomes. These findings provide an alternative avenue (i.e., subjective knowledge) for businesses and non-profit organizations to consider as an intervention. Fact-based messaging based on objective knowledge (e.g., "Your purchase helps to save 511 million gallons of water annually") may encourage sustainable behavior, but its effectiveness in driving desirable outcomes remains unclear. Complementary messaging aimed at increasing subjective knowledge (e.g., "You know a lot more about sustainability than you think," "Protecting the environment is easier than you think, you can do it!" or "You have the knowledge and ability to make a change, take your first step today!") should be explored to determine if it empowers consumers to embrace sustainable behaviors. Also, in line with previous research, highlighting ecofriendly features appears to be more effective for messaging related to utilitarian rather than hedonic products. Thus, businesses should be aware of the effectiveness of using subjective knowledge as an intervention when promoting green products.

For non-profit organizations focused on improving sustainability-related literacy, the current research shows that evaluations of this literacy should not overlook the importance of assessing and raising subjective knowledge levels. This dissertation recommends that sustainability assessments encompass both subjective and objective questions. Furthermore, organizations can identify those with high versus low subjective knowledge and craft more precise communications for each group.

Limitations and Directions for Future Research

Due to COVID-19 restrictions, all participants were recruited online either from TurkPrime or Amazon MTurk. Consequently, the results may not reflect views from a more general population. Future research should include a field study to enhance the external validity of the laboratory-based experimental results. A false feedback method was used to manipulate high versus low subjective knowledge groups. This method may not be practical for businesses to implement. Future studies should explore other types of manipulations (e.g., message type) or gamifications as ways to assess and increase subjective knowledge.

The main effect of subjective knowledge was found in study 1, but was not replicated in studies 3a, 3b, and 4. Thus, future research should aim to understand whether the main effect of subjective knowledge truly exists. To help reduce potential noise stemming from the stimuli, future studies may look for different ways to manipulate subjective knowledge and to control for the perceived difficulty of the test, participants' age, and interpretation of the product itself (e.g., quality and price). In addition, future studies should identify different ways to operationalize the main effect to increase real-world managerial applications.

It is also unclear to why no interaction effect was observed between subjective knowledge and construal level. The manipulations may have been too weak, which was an issue

for the self-identified time versus money construct (study 3a), or perhaps the interaction effect did not exist between the two factors. Thus, future research should look for ways to strengthen the construal level. It is also surprising that the interaction effect between high subjective knowledge and time orientation resulted in lower purchase intentions. The time construct thus should be examined in greater detail (e.g., manipulating the present versus future time mindset). Future research also should explore other moderators, such as the number of available choices and perceived functional versus symbolic value of green products. Hadar and Sood (2014) find that people who feel they lack knowledge in a certain domain show higher willingness to purchase when presented with more choices, and this effect is reversed when consumers feel they have high subject knowledge.

Though the present research expected no significant impact of subject knowledge on willingness to purchase hedonic green products, further insight is needed in this area. For example, consumers may disagree and did not view the product in the study (a hoodie) as hedonic, and thus did not express any positive feelings toward the product. Thus, to ensure internal validity, a pre-test should be given to measure consumer perceptions of relevant product dimensions (Crowley et al. 1992). More work should also be undertaken to understand whether the outcomes reported are attributed to the product category or the perceived goal of the product. Thus, future studies should consider using the same product, but highlight it as either utilitarian or hedonic goal-oriented. In addition, researchers may find that designing their studies in ways that facilitate use of confirmatory factor analysis and path analysis will enhance understanding of the relationships between and among the variables examined in this dissertation.

Ample research shows that factors such as accessibility, price, and product credibility can influence sustainability-friendly behaviors (Carrington, Neville and Whitwell 2010; Johnstone

and Tan 2015; Kennedy et al. 2009, 2009; Vermeir and Verbeke 2006). More can be done to identify ways to understand (and minimize) the impact of these factors in a variety of contexts and product domains (Carlson et al. 2008). Finally, further exploration is needed to understand the relationship between objective knowledge and subjective knowledge and the related impact on sustainable behaviors, especially considering that consumers are generally overconfident about their knowledge of climate science (Thaller and Brudermann 2020). It remains unclear how gaps between objective and subjective knowledge may impact environmentally responsible behaviors.

Appendices

Appendix 1

List of Measures

Measures	Items	Rating Scale	Adapted from
Subjective knowledge	How knowledgeable do you feel about sustainability?	1 = Not knowledgeable at all 5 = very knowledgeable	Hadar and Sood (2013, 2014)
	Rate your knowledge about sustainability compared to average consumers.	1 = far below average consumers 5 = far above average consumers	
Intention to buy	I intend to purchase the [product] in the future.	1 = very unlikely 5 = very likely	Hartmann and Apaolaza-Ibáñez (2012)
Attitude toward the brand	My attitude toward the [brand] is: • Unfavorable/favorable • Bad/good • Negative/positive	6-point semantic differential scale	Mogilner and Aaker (2009) Lee and Aaker (2004, experiment 3)
Confidence about one's knowledge	How confident are you in your knowledge about sustainability?	1 = not at all confident 5 = very confident	Hadar and Sood (2013, 2014)
Attitude toward the ad (used in study 1)	I found the advertisement to be favorable.	1 = strongly disagree 7 = strongly agree	MacKenzie et al. (1986)
	I found the advertisement to be interesting.		
Attitude toward the ad (used in studies 2-5)	My attitude toward the advertisement for [the product] is: • Negative /positive • Unfavorable /favorable • Unappealing/appealing	6-point semantic differential scale	Nan (2008)
Perceived consumer effectiveness	I can create a positive impact on the environment by signing petitions to help make a change.	1 = strongly disagree 7 = strongly agree	Kim and Choi (2005)
	I believe water conservation helps solve natural resources problems.		
	I can protect the environment by buying products that are friendly to the environment.		
	There is not much that I can do about the environment (r).		

Measures	Items	Rating Scale	Adapted from
	I feel capable of helping solve the environment problems.		
Green consumption value	It is important to me that the products use do not harm the environment.	1 = strongly disagree 5 = strongly agree	Haws et al. (2014)
	I consider the potential environmental impact of my actions when making many of my decisions.		
	My purchase habits are affected by my concern for our environment.		
	I am concerned about wasting the resources of our planet.		
	I would describe myself as environmentally responsible.		
	I am willing to be inconvenienced in order to take actions that are more environmentally friendly		
Green trust	I feel that this product's environmental reputation is generally reliable.	1 = definitely not 5 = definitely yes	Chen (2010)
	I feel that this product's environmental performance is generally dependable		
	I feel that this product's environmental claims are generally trustworthy.		
	This product's environmental concern meets my expectations.		
	This product keeps promises and commitments for environmental protection.		
Familiarity with the brand	How familiar are you with the Evolution Hoodie brand?	1 = not familiar at all 5 = very familiar	Park and Lessig (1981)

Appendix 2

Reliability Coefficients (Cronbach's alphas)

Measures	Study 1	Study 2	Study 3a	Study 3b	Study 4	Study 5
Subjective knowledge	.83	.74	.84	.80	.84	.70
Attitude toward the brand	.91	.95	.96	.94	.96	.87
Attitude toward the ad (used in study 1)	.75	N/A	N/A	N/A	N/A	N/A
Attitude toward the ad (used in studies 2-5)	N/A	.96	.96	.95	.96	.91
Perceived consumer effectiveness	.84	.81	N/A	N/A	N/A	N/A
Green consumption value	.93	.94	.93	.94	.94	.90
Green trust	.89	.95	N/A	N/A	N/A	N/A

Appendix 3

Sustainability Quiz

Q7.1 What is the largest source of greenhouse gas emissions in the United States?
- Transportation (1)
- Commercial and Residential (2)
- Agriculture (3)
- Land Use and Forestry (4)

Q7.2 True or False: The United States ranked among the world's top five CO2 producing countries.
- True (1)
- False (2)

Q7.3 True or False: Methane is a greenhouse gas that is 20 times more harmful than carbon dioxide.
- True (1)
- False (2)

Q7.4 Which of the activities below has the most harmful environmental impact?
- Keeping a cell phone charger plugged into an electrical outlet for 12 hours (1)
- Producing one McDonald's quarter-pound hamburger (2)
- Producing one McDonald's chicken sandwich (3)
- One passenger flying on a commercial airline flight from New York to Chicago (4)

Q8.1 Which of the following is the most commonly used definition of sustainable development?
- Creating a government welfare system that ensures universal access to education, health care, and social services (1)
- Setting aside resources for preservation, never to be used (2)
- Meeting the needs of the present without compromising the ability of future generations to meet their own needs (3)
- Building a neighborhood that is both socio-demographically and economically diverse (4)

Q8.2 True or False: Appliances that are turned off don't use any electricity.
- True (1)
- False (2)

Q8.3 Which uses less water, washing a full load of dishes by hand or in the dishwasher?
- Dishwasher (1)
- By Hand (2)
- Both methods use the same amount of water (3)

Q8.4 Which of the following is an example of sustainable forest management?
- Setting aside forests to be off limits to the public (1)
- Never harvesting more than what the forest produces in new growth (2)
- Producing lumber for nearby communities to build affordable housing (3)
- Putting the local communities in charge of forest resources (4)

Q9.1 Approximately how many million barrels of oil were released into the Gulf of Mexico from the Deepwater Horizon incident in April 2010?
- 3 million barrels (1)
- 4-5 million barrels (2)
- 6-8 million barrels (3)
- more than 8 million barrels (4)

Q9.2 What is the most common cause of pollution of streams and rivers?

- Dumping of garbage by cities (1)
- Surface water running off yards, city streets, paved lots, and farm fields (2)
- Litter near streams and rivers (3)
- All of the above (4)

Q9.3 Which chemical below is a key component of photochemical smog?

- Ozone (1)
- Carbon dioxide (2)
- Sulfur dioxide (3)
- Lead (4)

Q9.4 Ozone forms a protective layer in the earth's upper atmosphere. What does the ozone layer protect us from?

- Acid Rain (1)
- Climate Change (2)
- Sudden changes in temperature (3)
- Harmful UV rays (4)

References

Aaker, Jennifer L, Melanie Rudd, and Cassie Mogilner (2011), "If Money Does Not Make You Happy, Consider Time," *Journal of consumer psychology*, 21(2), 126–30.

Adaval, Rashmi (2001), "Sometimes It Just Feels Right: The Differential Weighting of Affect-Consistent and Affect-Inconsistent Product Information," *Journal of Consumer Research*, 28(1), 1–17.

Aertsens, Joris, Koen Mondelaers, Wim Verbeke, Jeroen Buysse, and Guido Van Huylenbroeck (2011), "The Influence of Subjective and Objective Knowledge on Attitude, Motivations and Consumption of Organic Food," *British food journal*, 113(11), 1353–78.

Ajzen, Icek (1991), "The Theory of Planned Behavior," *Organizational behavior and human decision processes*, 50(2), 179–211.

——— (2002), "Perceived Behavioral Control, Self-efficacy, Locus of Control, and the Theory of Planned Behavior 1," *Journal of applied social psychology*, 32(4), 665–83.

Alba, Joseph W and J Wesley Hutchinson (1987), "Dimensions of Consumer Expertise," *Journal of consumer research*, 13(4), 411–54.

Allen, Chris T. (1982), "Self-Perception Based Strategies for Stimulating Energy Conservation," *Journal of Consumer Research*, 8(4), 381.

Al-Naqbi, Ali Khalfan and Qasim Alshannag (2018), "The Status of Education for Sustainable Development and Sustainability Knowledge, Attitudes, and Behaviors of UAE University Students.," *International Journal of Sustainability in Higher Education*, 19(3), 566–88.

Anderson Jr, W Thomas and William H Cunningham (1972), "The Socially Conscious Consumer," *Journal of marketing*, 36(3), 23–31.

Antonetti, Paolo and Stan Maklan (2014), "Feelings That Make a Difference: How Guilt and Pride Convince Consumers of the Effectiveness of Sustainable Consumption Choices," *Journal of Business Ethics*, 124(1), 117–34.

Arbuthnott, Katherine D (2009), "Education for Sustainable Development beyond Attitude Change," *International Journal of Sustainability in Higher Education*, 10(2), 152–63.

Arcury, Thomas A (1990), "Environmental Attitude and Environmental Knowledge," *Human organization*, 300–304.

Armitage, Christopher J and Mark Conner (2001), "Efficacy of the Theory of Planned Behaviour: A Meta-analytic Review," *British journal of social psychology*, 40(4), 471–99.

Armstrong, Anne K., Marianne E. Krasny, and Jonathon P. Schuldt (2018), "CLIMATE CHANGE EDUCATION OUTCOMES," in *Communicating Climate Change*, Cornell University Press, 25–31, http://www.jstor.org/stable/10.7591/j.ctv941wjn.7.

Babin, Barry J, William R Darden, and Mitch Griffin (1994), "Work and/or Fun: Measuring Hedonic and Utilitarian Shopping Value," *Journal of consumer research*, 20(4), 644–56.

Baca-Motes, Katie, Amber Brown, Ayelet Gneezy, Elizabeth A Keenan, and Leif D Nelson (2012), "Commitment and Behavior Change: Evidence from the Field," *Journal of Consumer Research*, 39(5), 1070–84.

Balderjahn, Ingo (1988), "Personality Variables and Environmental Attitudes as Predictors of Ecologically Responsible Consumption Patterns," *Journal of business Research*, 17(1), 51–56.

Bandura, Albert (1997), *Self-Efficacy: The Exercise of Control*, Macmillan.

——— (2010), "Self-efficacy," *The Corsini encyclopedia of psychology*, 1–3.

Bartiaux, Françoise (2008), "Does Environmental Information Overcome Practice Compartmentalisation and Change Consumers' Behaviours?," *Journal of Cleaner Production*, 16(11), 1170–80.

Batra, Rajeev and Olli T Ahtola (1991), "Measuring the Hedonic and Utilitarian Sources of Consumer Attitudes," *Marketing letters*, 2(2), 159–70.

Beckham, Daisy and Benjamin G Voyer (2014), "Can Sustainability Be Luxurious? A Mixed-Method Investigation of Implicit and Explicit Attitudes towards Sustainable Luxury Consumption," *ACR North American Advances*.

Bell, Simon J, Peter J Erwin, and Colin S McLeod (1996), "Attitudes, Norms and Knowledge: Implications for Ecologically Sound Purchasing Behavior," 349–56.

Benveniste, Alexis (2019), "Average Americans Can't Afford to Buy Green," *Bloomberg*, March 7, https://www.bloomberg.com/news/articles/2019-03-07/it-s-not-cheap-being-a-green-consumer.

Bergadaa, Michelle M (1990), "The Role of Time in the Action of the Consumer," *Journal of consumer research*, 17(3), 289–302.

Berger, Ida E and Ruth M Corbin (1992), "Perceived Consumer Effectiveness and Faith in Others as Moderators of Environmentally Responsible Behaviors," *Journal of Public Policy & Marketing*, 11(2), 79–89.

Bettman, James R and C Whan Park (1980), "Effects of Prior Knowledge and Experience and Phase of the Choice Process on Consumer Decision Processes: A Protocol Analysis," *Journal of consumer research*, 7(3), 234–48.

Bodur, H Onur, Kimberly M Duval, and Bianca Grohmann (2015), "Will You Purchase Environmentally Friendly Products? Using Prediction Requests to Increase Choice of Sustainable Products," *Journal of Business Ethics*, 129(1), 59–75.

Bradley, Jennifer Campbell, Tina M Waliczek, and Jayne M Zajicek (1999), "Relationship between Environmental Knowledge and Environmental Attitude of High School Students," *The Journal of Environmental Education*, 30(3), 17–21.

Bray, Jeffery, Nick Johns, and David Kilburn (2011), "An Exploratory Study into the Factors Impeding Ethical Consumption," *Journal of business ethics*, 98(4), 597–608.

Broniarczyk, Susan, J Hutchinson, and Joseph W Alba (1992), "What Consumers 'Really'Know and What They 'Think'They Know: Investigations into the Determinants of Confidence and Performance," *Advances in Consumer Research*, 19(1), 191–191.

Brough, Aaron R, James EB Wilkie, Jingjing Ma, Mathew S Isaac, and David Gal (2016), "Is Eco-Friendly Unmanly? The Green-Feminine Stereotype and Its Effect on Sustainable Consumption," *Journal of Consumer Research*, 43(4), 567–82.

Brucks, Merrie (1985), "The Effects of Product Class Knowledge on Information Search Behavior," *Journal of consumer research*, 1–16.

Brundtland, Gro Harlem (1987), *Report of the World Commission on Environment and Development:" Our Common Future."*, United Nations.

Burton, Scot, Judith A Garretson, and Anne M Velliquette (1999), "Implications of Accurate Usage of Nutrition Facts Panel Information for Food Product Evaluations and Purchase Intentions," *Journal of the Academy of Marketing Science*, 27(4), 470–80.

Carlson, Jay P, Leslie H Vincent, David M Hardesty, and William O Bearden (2008), "Objective and Subjective Knowledge Relationships: A Quantitative Analysis of Consumer Research Findings," *Journal of Consumer Research*, 35(5), 864–76.

Carrington, Michal J, Benjamin A Neville, and Gregory J Whitwell (2010), "Why Ethical Consumers Don't Walk Their Talk: Towards a Framework for Understanding the Gap between the Ethical Purchase Intentions and Actual Buying Behaviour of Ethically Minded Consumers," *Journal of business ethics*, 97(1), 139–58.

Chabowski, Brian R, Jeannette A Mena, and Tracy L Gonzalez-Padron (2011), "The Structure of Sustainability Research in Marketing, 1958–2008: A Basis for Future Research Opportunities," *Journal of the Academy of Marketing Science*, 39(1), 55–70.

Chen, Chih-Cheng, Chien-Wen Chen, and Yi-Chun Tung (2018), "Exploring the Consumer Behavior of Intention to Purchase Green Products in Belt and Road Countries: An Empirical Analysis," *Sustainability*, 10(3), 854.

Chen, Yu-Shan (2010), "The Drivers of Green Brand Equity: Green Brand Image, Green Satisfaction, and Green Trust," *Journal of Business ethics*, 93(2), 307–19.

Chitturi, Ravindra, Rajagopal Raghunathan, and Vijay Mahajan (2008), "Delight by Design: The Role of Hedonic versus Utilitarian Benefits," *Journal of marketing*, 72(3), 48–63.

Choi, Jungsil, Yexin Jessica Li, Priyamvadha Rangan, Promothesh Chatterjee, and Surendra N Singh (2014), "The Odd-Ending Price Justification Effect: The Influence of Price-Endings on Hedonic and Utilitarian Consumption," *Journal of the Academy of Marketing Science*, 42(5), 545–57.

Closs, David J, Cheri Speier, and Nathan Meacham (2011), "Sustainability to Support End-to-End Value Chains: The Role of Supply Chain Management," *Journal of the Academy of Marketing Science*, 39(1), 101–16.

Cole, Catherine A, Gary Gaeth, Goutam Chakraborty, and Irwin Levin (1992), "Exploring the Relationships among Self-Reported Knowledge, Objective Knowledge, Product Usage, and Consumer Decision Making," *Advances in Consumer Research*, 19(1), p191.

Conca, James (2015), "Making Climate Change Fashionable - The Garment Industry Takes On Global Warming," *Forbes*, https://www.forbes.com/sites/jamesconca/2015/12/03/making-climate-change-fashionable-the-garment-industry-takes-on-global-warming/.

Cowley, Elizabeth and Andrew A Mitchell (2003), "The Moderating Effect of Product Knowledge on the Learning and Organization of Product Information," *Journal of Consumer Research*, 30(3), 443–54.

Crowley, Ayn E, Eric R Spangenberg, and Kevin R Hughes (1992), "Measuring the Hedonic and Utilitarian Dimensions of Attitudes toward Product Categories," *Marketing letters*, 3(3), 239–49.

Csikszentmihalyi, Mihaly (2000), "The Costs and Benefits of Consuming," *Journal of consumer Research*, 27(2), 267–72.

Dangelico, Rosa Maria and Pierpaolo Pontrandolfo (2010), "From Green Product Definitions and Classifications to the Green Option Matrix," *Journal of Cleaner Production*, 18(16–17), 1608–28.

De Angelis, Matteo, Feray Adıgüzel, and Cesare Amatulli (2017), "The Role of Design Similarity in Consumers' Evaluation of New Green Products: An Investigation of Luxury Fashion Brands," *Journal of Cleaner Production*, 141, 1515–27.

Decamps, Aureilen (2019), "HLPF Report 2019," *Sulitest.org*, https://www.sulitest.org/en/reports.html.

DeVoe, Sanford E and Julian House (2012), "Time, Money, and Happiness: How Does Putting a Price on Time Affect Our Ability to Smell the Roses?," *Journal of Experimental Social Psychology*, 48(2), 466–74.

Dhar, Ravi and Klaus Wertenbroch (2000), "Consumer Choice between Hedonic and Utilitarian Goods," *Journal of marketing research*, 37(1), 60–71.

Dietz, Thomas, Elinor Ostrom, and Paul C Stern (2003), "The Struggle to Govern the Commons," *science*, 302(5652), 1907–12.

Ellen, Pam Scholder (1994), "Do We Know What We Need to Know? Objective and Subjective Knowledge Effects on pro-Ecological Behaviors," *Journal of Business Research*, 30(1), 43–52.

Ellen, Pam Scholder, Joshua Lyle Wiener, and Cathy Cobb-Walgren (1991), "The Role of Perceived Consumer Effectiveness in Motivating Environmentally Conscious Behaviors," *Journal of public policy & marketing*, 10(2), 102–17.

Feick, Lawrence, C Whan Park, and David L Mothersbaugh (1992), "Knowledge and Knowledge of Knowledge: What We Know, What We Think We Know, and Why the Difference Makes a Difference," *ACR North American Advances*.

Findler, Florian, Norma Schönherr, Rodrigo Lozano, and Barbara Stacherl (2019), "Assessing the Impacts of Higher Education Institutions on Sustainable Development—An Analysis of Tools and Indicators," *Sustainability*, 11(1), 59.

Fishbein, Martin (1963), "An Investigation of the Relationships between Beliefs about an Object and the Attitude toward That Object," *Human relations*, 16(3), 233–39.

Fishbein, Martin and Icek Ajzen (2011), *Predicting and Changing Behavior: The Reasoned Action Approach*, Taylor & Francis.

Fransson, Niklas and Tommy Gärling (1999), "Environmental Concern: Conceptual Definitions, Measurement Methods, and Research Findings," *Journal of environmental psychology*, 19(4), 369–82.

Freitas, Antonio L, Peter Gollwitzer, and Yaacov Trope (2004), "The Influence of Abstract and Concrete Mindsets on Anticipating and Guiding Others' Self-Regulatory Efforts," *Journal of experimental social psychology*, 40(6), 739–52.

Gámbaro, Adriana, Ana C Ellis, and Víctor Prieto (2013), "Influence of Subjective Knowledge, Objective Knowledge and Health Consciousness on Olive Oil Consumption—A Case Study," *Food and Nutrition Sciences*, 4(04), 445.

Gino, Francesca and Cassie Mogilner (2014), "Time, Money, and Morality," *Psychological Science*, 25(2), 414–21.

Gleim, Mark R, Jeffery S Smith, Demetra Andrews, and J Joseph Cronin Jr (2013), "Against the Green: A Multi-Method Examination of the Barriers to Green Consumption," *Journal of retailing*, 89(1), 44–61.

Goldstein, Noah J, Robert B Cialdini, and Vladas Griskevicius (2008), "A Room with a Viewpoint: Using Social Norms to Motivate Environmental Conservation in Hotels," *Journal of consumer Research*, 35(3), 472–82.

Graham, Robert J (1981), "The Role of Perception of Time in Consumer Research," *Journal of consumer research*, 7(4), 335–42.

Griskevicius, Vladas, Stephanie M Cantú, and Mark van Vugt (2012), "The Evolutionary Bases for Sustainable Behavior: Implications for Marketing, Policy, and Social Entrepreneurship," *Journal of Public Policy & Marketing*, 31(1), 115–28.

Griskevicius, Vladas, Joshua M Tybur, and Bram Van den Bergh (2010), "Going Green to Be Seen: Status, Reputation, and Conspicuous Conservation.," *Journal of personality and social psychology*, 98(3), 392.

Hadar, Liat and Sanjay Sood (2014), "When Knowledge Is Demotivating: Subjective Knowledge and Choice Overload," *Psychological science*, 25(9), 1739–47.

Hadar, Liat, Sanjay Sood, and Craig R Fox (2013), "Subjective Knowledge in Consumer Financial Decisions," *Journal of Marketing Research*, 50(3), 303–16.

Hartmann, Patrick and Vanessa Apaolaza-Ibáñez (2012), "Consumer Attitude and Purchase Intention toward Green Energy Brands: The Roles of Psychological Benefits and Environmental Concern," *Journal of business Research*, 65(9), 1254–63.

Haws, Kelly L. and Cait Poynor (2008), "Seize the Day! Encouraging Indulgence for the Hyperopic Consumer," *Journal of Consumer Research*, 35(4), 680–91.

Haws, Kelly L, Karen Page Winterich, and Rebecca Walker Naylor (2014), "Seeing the World through GREEN-Tinted Glasses: Green Consumption Values and Responses to Environmentally Friendly Products," *Journal of Consumer Psychology*, 24(3), 336–54.

Heeren, Alexander John, Ajay S Singh, Adam Zwickle, Tomas M Koontz, Kristina M Slagle, and Anna C McCreery (2016), "Is Sustainability Knowledge Half the Battle? An Examination of Sustainability Knowledge, Attitudes, Norms, and Efficacy to Understand Sustainable Behaviours," *International Journal of Sustainability in Higher Education*, 17(5), 613–32.

Hershfield, Hal E, Cassie Mogilner, and Uri Barnea (2016), "People Who Choose Time over Money Are Happier," *Social Psychological and Personality Science*, 7(7), 697–706.

Hippo Sak (2018), "Plant-Based Tall Kitchen Trash Bag by Hippo Sak," *HippoSak*, http://www.hipposak.com/plant-based-bag/.

Hirschman, Elizabeth C and Morris B Holbrook (1982), "Hedonic Consumption: Emerging Concepts, Methods and Propositions," *Journal of marketing*, 46(3), 92–101.

Hong, Jiewen and Brian Sternthal (2010), "The Effects of Consumer Prior Knowledge and Processing Strategies on Judgments," *Journal of Marketing Research*, 47(2), 301–11.

House, Lisa O, Jayson Lusk, Sara R Jaeger, Bruce Traill, Melissa Moore, Carlotta Valli, Bert Morrow, and Wallace Yee (2004), "Objective and Subjective Knowledge: Impacts on Consumer Demand for Genetically Modified Foods in the United States and the European Union."

Hult, G Tomas M (2011), "Market-Focused Sustainability: Market Orientation Plus!"

Hutchinson, J. Wesley and Joseph W. Alba (2000), "Knowledge Calibration: What Consumers Know and What They Think They Know," *Journal of Consumer Research*, 27(2), 123–56.

Jacoby, Jacob, George J Szybillo, and Carol Kohn Berning (1976), "Time and Consumer Behavior: An Interdisciplinary Overview," *Journal of Consumer Research*, 2(4), 320–39.

Jägel, Thomas, Kathy Keeling, Alexander Reppel, and Thorsten Gruber (2012), "Individual Values and Motivational Complexities in Ethical Clothing Consumption: A Means-End Approach," *Journal of Marketing Management*, 28(3–4), 373–96.

Jensen, Bjarne Bruun (2002), "Knowledge, Action and pro-Environmental Behaviour," *Environmental education research*, 8(3), 325–34.

Jerit, Jennifer, Jason Barabas, William Pollock, Susan Banducci, Daniel Stevens, and Martijn Schoonvelde (2016), "Manipulated vs. Measured: Using an Experimental Benchmark to Investigate the Performance of Self-Reported Media Exposure," *Communication Methods and Measures*, 10(2–3), 99–114.

Johnstone, Micael-Lee and Lay Peng Tan (2015), "Exploring the Gap between Consumers' Green Rhetoric and Purchasing Behaviour," *Journal of Business Ethics*, 132(2), 311–28.

Kaiser, Florian G and Urs Fuhrer (2003), "Ecological Behavior's Dependency on Different Forms of Knowledge," *Applied psychology*, 52(4), 598–613.

Kanwar, Rajesh, Lorna Grund, and Jerry C Olson (1990), "When Do the Measures of Knowledge Measure What We Think They Are Measuring?," *ACR North American Advances*.

Kennedy, Emily Huddart, Thomas M Beckley, Bonita L McFarlane, and Solange Nadeau (2009), "Why We Don't" Walk the Talk": Understanding the Environmental Values/Behaviour Gap in Canada," *Human Ecology Review*, 151–60.

Kennedy, Sarah (2019), "Why Don't More People Buy Sustainable Products? » Yale Climate Connections," *Yale Climate Connections*, https://www.yaleclimateconnections.org/2019/04/why-dont-more-people-buy-sustainable-products/.

Kickstarter (2019), "Evolution Hoodie: Made from Recycled Coffee Grounds," *Kickstarter*, https://www.kickstarter.com/projects/coalatree/evolution-hoodie-made-from-recycled-coffee-grounds.

Kidwell, Blair, Adam Farmer, and David M Hardesty (2013), "Getting Liberals and Conservatives to Go Green: Political Ideology and Congruent Appeals," *Journal of Consumer Research*, 40(2), 350–67.

Kilbourne, William, Pierre McDonagh, and Andrea Prothero (1997), "Sustainable Consumption and the Quality of Life: A Macromarketing Challenge to the Dominant Social Paradigm," *Journal of macromarketing*, 17(1), 4–24.

Kim, Yeonshin and Sejung Marina Choi (2005), "Antecedents of Green Purchase Behavior: An Examination of Collectivism, Environmental Concern, and PCE," *ACR North American Advances*.

Kim, Youn-Kyung, Judith Forney, and Elizabeth Arnold (1997), "Environmental Messages in Fashion Advertisements: Impact on Consumer Responses," *Clothing and Textiles Research Journal*, 15(3), 147–54.

Kinnear, Thomas C., James R. Taylor, and Sadrudin A. Ahmed (1974), "Ecologically Concerned Consumers: Who Are They?," *Journal of Marketing*, 38(2), 20–24.

Kivetz, Ran and Itamar Simonson (2002), "Earning the Right to Indulge: Effort as a Determinant of Customer Preferences toward Frequency Program Rewards," *Journal of Marketing Research*, 39(2), 155–70.

Kivetz, Yifat and Tom R Tyler (2007), "Tomorrow I'll Be Me: The Effect of Time Perspective on the Activation of Idealistic versus Pragmatic Selves," *Organizational Behavior and Human Decision Processes*, 102(2), 193–211.

Kollmuss, Anja and Julian Agyeman (2002), "Mind the Gap: Why Do People Act Environmentally and What Are the Barriers to pro-Environmental Behavior?," *Environmental education research*, 8(3), 239–60.

Kremer, John MD, Aidan Moran, Graham Walker, and Cathy Craig (2011), *Key Concepts in Sport Psychology*, Sage.

Kronrod, Ann, Amir Grinstein, and Luc Wathieu (2011), "Enjoy! Hedonic Consumption and Compliance with Assertive Messages," *Journal of Consumer Research*, 39(1), 51–61.

——— (2012), "Go Green! Should Environmental Messages Be so Assertive?," *Journal of Marketing*, 76(1), 95–102.

Leclerc, France, Bernd H Schmitt, and Laurette Dube (1995), "Waiting Time and Decision Making: Is Time like Money?," *Journal of Consumer Research*, 22(1), 110–19.

Lee, Yoon-Joo, Eric Haley, and Kiseol Yang (2019), "The Role of Organizational Perception, Perceived Consumer Effectiveness and Self-Efficacy in Recycling Advocacy Advertising Effectiveness," *Environmental Communication*, 13(2), 239–54.

Liang, Ta-Ching, Rospita Odorlina P Situmorang, Mei-Chi Liao, and Shu-Chun Chang (2020), "The Relationship of Perceived Consumer Effectiveness, Subjective Knowledge, and Purchase Intention on Carbon Label Products—A Case Study of Carbon-Labeled Packaged Tea Products in Taiwan," *Sustainability*, 12(19), 7892.

Liberman, Nira and Yaacov Trope (1998), "The Role of Feasibility and Desirability Considerations in near and Distant Future Decisions: A Test of Temporal Construal Theory.," *Journal of personality and social psychology*, 75(1), 5.

Lin, Ying-Ching and Chiu-chi Angela Chang (2012), "Double Standard: The Role of Environmental Consciousness in Green Product Usage," *Journal of Marketing*, 76(5), 125–34.

Liu, Wendy and Jennifer Aaker (2008), "The Happiness of Giving: The Time-Ask Effect," *Journal of consumer research*, 35(3), 543–57.

Longo, Cristina, Avi Shankar, and Peter Nuttall (2017), "'It's Not Easy Living a Sustainable Lifestyle': How Greater Knowledge Leads to Dilemmas, Tensions and Paralysis," *Journal of Business Ethics*, 1–21.

Lozano, Rodrigo (2006), "Incorporation and Institutionalization of SD into Universities: Breaking through Barriers to Change," *Journal of cleaner production*, 14(9–11), 787–96.

Luchs, Michael G and Minu Kumar (2017), "'Yes, but This Other One Looks Better/Works Better': How Do Consumers Respond to Trade-Offs between Sustainability and Other Valued Attributes?," *Journal of business ethics*, 140(3), 567–84.

Luchs, Michael G, Rebecca Walker Naylor, Julie R Irwin, and Rajagopal Raghunathan (2010), "The Sustainability Liability: Potential Negative Effects of Ethicality on Product Preference," *Journal of Marketing*, 74(5), 18–31.

Lundblad, Louise and Iain A Davies (2016), "The Values and Motivations behind Sustainable Fashion Consumption," *Journal of Consumer Behaviour*, 15(2), 149–62.

Lupberger, Ryan (2017), "5 Reasons Why Millennials Don't Buy Green Brands — and a Better Way to Reach Them," *Conscious Company*, https://consciouscompanymedia.com/sustainable-business/marketing/5-reasons-millennials-dont-buy-green-brands-better-way-reach/.

MacKenzie, Scott B, Richard J Lutz, and George E Belch (1986), "The Role of Attitude toward the Ad as a Mediator of Advertising Effectiveness: A Test of Competing Explanations," *Journal of marketing research*, 23(2), 130–43.

Maichum, Kamonthip, Surakiat Parichatnon, and Ke-Chung Peng (2016), "Application of the Extended Theory of Planned Behavior Model to Investigate Purchase Intention of Green Products among Thai Consumers," *Sustainability*, 8(10), 1077.

Mark, Summer (2019), "Can the Fashion Industry Ever Really Be Sustainable?," *The Fashion Law*, http://www.thefashionlaw.com/home/can-the-fashion-industry-ever-really-be-sustainable.

Marques, Carlos Peixeira and Danny Almeida (2013), "A Path Model of Attitudinal Antecedents of Green Purchase Behaviour," *Economics & Sociology*, 6(2), 135.

McDonagh, Pierre and Andrea Prothero (1997), *Green Management: A Reader*, International Thomson Business Press.

Miller, Thaddeus R, Tischa Munoz-Erickson, and Charles L Redman (2011), "Transforming Knowledge for Sustainability: Towards Adaptive Academic Institutions," *International Journal of Sustainability in Higher Education*, 12(2), 177–92.

Mitchell, Andrew A and Jerry C Olson (1981), "Are Product Attribute Beliefs the Only Mediator of Advertising Effects on Brand Attitude?," *Journal of marketing research*, 18(3), 318–32.

Mitchell, Terence R and Amy E Mickel (1999), "The Meaning of Money: An Individual-Difference Perspective," *Academy of management review*, 24(3), 568–78.

Mobley, Catherine, Wade M Vagias, and Sarah L DeWard (2010), "Exploring Additional Determinants of Environmentally Responsible Behavior: The Influence of Environmental Literature and Environmental Attitudes," *Environment and Behavior*, 42(4), 420–47.

Mogilner, Cassie (2010), "The Pursuit of Happiness: Time, Money, and Social Connection," *Psychological Science*, 21(9), 1348–54.

Mogilner, Cassie and Jennifer Aaker (2009), "'The Time vs. Money Effect': Shifting Product Attitudes and Decisions through Personal Connection," *Journal of Consumer Research*, 36(2), 277–91.

Mohr, Lois A, Doğan Eroğlu, and Pam Scholder Ellen (1998), "The Development and Testing of a Measure of Skepticism toward Environmental Claims in Marketers' Communications," *Journal of consumer affairs*, 32(1), 30–55.

Moorman, Christine, Kristin Diehl, David Brinberg, and Blair Kidwell (2004), "Subjective Knowledge, Search Locations, and Consumer Choice," *Journal of Consumer Research*, 31(3), 673–80.

Moreau, C Page, Donald R Lehmann, and Arthur B Markman (2001), "Entrenched Knowledge Structures and Consumer Response to New Products," *Journal of marketing research*, 38(1), 14–29.

Moser, Andrea K (2015), "Thinking Green, Buying Green? Drivers of pro-Environmental Purchasing Behavior," *Journal of Consumer Marketing*, 32(3), 167–75.

Nan, Xiaoli (2008), "The Pursuit of Self-Regulatory Goals: How Counterfactual Thinking Influences Advertising Persuasiveness," *Journal of Advertising*, 37(1), 17–27.

Newman, George E, Margarita Gorlin, and Ravi Dhar (2014), "When Going Green Backfires: How Firm Intentions Shape the Evaluation of Socially Beneficial Product Enhancements," *Journal of Consumer Research*, 41(3), 823–39.

Nielsen (2018), "Was 2018 the Year of the Influential Sustainable Consumer?," *Nielson*, https://www.nielsen.com/us/en/insights/article/2018/was-2018-the-year-of-the-influential-sustainable-consumer.

——— (2021), "Sustainability Connects Retailers & Brands with Conscientious Consumers," *NielsenIQ*, https://nielseniq.com/global/en/insights/report/2021/sustainability-connects-retailers-brands-with-conscientious-consumers /.

Ok Park, Jong and Sang-Hee Sohn (2018), "The Role of Knowledge in Forming Attitudes and Behavior toward Green Purchase," *Social Behavior and Personality: an international journal*, 46(12), 1937–53.

Okada, Erica Mina (2005), "Justification Effects on Consumer Choice of Hedonic and Utilitarian Goods," *Journal of marketing research*, 42(1), 43–53.

Okada, Erica Mina and Stephen J Hoch (2004), "Spending Time versus Spending Money," *Journal of consumer research*, 31(2), 313–23.

Olsen, Mitchell C, Rebecca J Slotegraaf, and Sandeep R Chandukala (2014), "Green Claims and Message Frames: How Green New Products Change Brand Attitude," *Journal of Marketing*, 78(5), 119–37.

Olson, Jerry C (1978), "Inferential Belief Formation in the Cue Utilization Process," *ACR North American Advances*.

Palmatier, Robert W, Rajiv P Dant, Dhruv Grewal, and Kenneth R Evans (2006), "Factors Influencing the Effectiveness of Relationship Marketing: A Meta-Analysis," *Journal of marketing*, 70(4), 136–53.

Park, C Whan and V Parker Lessig (1981), "Familiarity and Its Impact on Consumer Decision Biases and Heuristics," *Journal of consumer research*, 8(2), 223–30.

Park, C Whan, David L Mothersbaugh, and Lawrence Feick (1994), "Consumer Knowledge Assessment," *Journal of consumer research*, 21(1), 71–82.

Pauw, Jelle, Niklas Gericke, Daniel Olsson, and Teresa Berglund (2015), "The Effectiveness of Education for Sustainable Development," *Sustainability*, 7(11), 15693–717.

Peattie, Ken and Sue Peattie (2009), "Social Marketing: A Pathway to Consumption Reduction?," *Journal of Business Research*, 62(2), 260–68.

Pe'er, Sara, Daphne Goldman, and Bela Yavetz (2007), "Environmental Literacy in Teacher Training: Attitudes, Knowledge, and Environmental Behavior of Beginning Students," *The Journal of Environmental Education*, 39(1), 45–59.

Perrin, Andrew and Sara Atske (2021), "7% of Americans Don't Use the Internet. Who Are They?," *Pew Research Center*, https://www.pewresearch.org/fact-tank/2021/04/02/7-of-americans-dont-use-the-internet-who-are-they/.

Peschel, Anne O, Carola Grebitus, Bodo Steiner, and Michele Veeman (2016), "How Does Consumer Knowledge Affect Environmentally Sustainable Choices? Evidence from a Cross-Country Latent Class Analysis of Food Labels," *Appetite*, 106, 78–91.

Philippe, Aurier and Paul-Valentin Ngobo (1999), "Assessment of Consumer Knowledge and Its Consequences: A Multi-Component Approach," *ACR North American Advances*.

Pickett-Baker, Josephine and Ritsuko Ozaki (2008), "Pro-Environmental Products: Marketing Influence on Consumer Purchase Decision," *Journal of consumer marketing*, 25(5), 281–93.

Pieniak, Zuzanna, Joris Aertsens, and Wim Verbeke (2010), "Subjective and Objective Knowledge as Determinants of Organic Vegetables Consumption," *Food quality and preference*, 21(6), 581–88.

Raab, Carolyn and Deana Grobe (2005), "Consumer Knowledge and Perceptions about Organic Food," *J Extension*, 43.

Radocchia, Samantha (2018), "What The Denim Industry Needs To Support A Sustainable Supply Chain," *Forbes*, https://www.forbes.com/sites/samantharadocchia/2018/12/26/what-the-denim-industry-needs-to-support-a-sustainable-supply-chain/.

Raju, Puthankurissi S, Subhash C Lonial, and W Glynn Mangold (1995), "Differential Effects of Subjective Knowledge, Objective Knowledge, and Usage Experience on Decision Making: An Exploratory Investigation," *Journal of consumer psychology*, 4(2), 153–80.

Ramsey, Charles E and Roy E Rickson (1976), "Environmental Knowledge and Attitudes," *The Journal of Environmental Education*, 8(1), 10–18.

Rao, Akshay R and Kent B Monroe (1988), "The Moderating Effect of Prior Knowledge on Cue Utilization in Product Evaluations," *Journal of consumer research*, 15(2), 253–64.

Reczek, Rebecca Walker, Remi Trudel, and Katherine White (2018), "Focusing on the Forest or the Trees: How Abstract versus Concrete Construal Level Predicts Responses to Eco-Friendly Products," *Journal of Environmental Psychology*, 57, 87–98.

Ryoo, Yuhosua, Na Kyong Hyun, and Yongjun Sung (2017), "The Effect of Descriptive Norms and Construal Level on Consumers' Sustainable Behaviors," *Journal of Advertising*, 46(4), 536–49.

Sachdeva, Sonya, Jennifer Jordan, and Nina Mazar (2015), "Green Consumerism: Moral Motivations to a Sustainable Future," *Current Opinion in Psychology*, 6, 60–65.

Saini, Ritesh and Ashwani Monga (2008), "How I Decide Depends on What I Spend: Use of Heuristics Is Greater for Time than for Money," *Journal of Consumer Research*, 34(6), 914–22.

Sawyer, Alan G and A Dwayne Ball (1981), "Statistical Power and Effect Size in Marketing Research," *Journal of Marketing Research*, 18(3), 275–90.

Schuhwerk, Melody E and Roxanne Lefkoff-Hagius (1995), "Green or Non-Green? Does Type of Appeal Matter When Advertising a Green Product?," *Journal of advertising*, 24(2), 45–54.

Schulze, Christian, Lisa Schöler, and Bernd Skiera (2014), "Not All Fun and Games: Viral Marketing for Utilitarian Products," *Journal of Marketing*, 78(1), 1–19.

Scott, Carol A (1977), "Modifying Socially-Conscious Behavior: The Foot-in-the-Door Technique," *Journal of Consumer Research*, 4(3), 156–64.

Seuring, Stefan, Joseph Sarkis, Martin Müller, and Purba Rao (2008), "Sustainability and Supply Chain Management–an Introduction to the Special Issue."

Shaw, Deirdre and Ian Clarke (1999), "Belief Formation in Ethical Consumer Groups: An Exploratory Study," *Marketing intelligence & planning*.

Shaw, Deirdre and Edward Shiu (2002), "An Assessment of Ethical Obligation and Self-identity in Ethical Consumer Decision-making: A Structural Equation Modelling Approach," *International Journal of Consumer Studies*, 26(4), 286–93.

Silvestri, Rachel (2021), "Fast Fashion Is Still a Big Threat to Our Environment — Here's What Needs to Change," *Vogue Arabia*, https://en.vogue.me/fashion/fast-fashion-2021-statistics/.

Solomon, Michael R, Darren William Dahl, Katherine White, Judith L Zaichkowsky, and Rosemary Polegato (2014), *Consumer Behavior: Buying, Having, and Being*, 10, Pearson Toronto, Canada.

Soloviy, Vitaliy (2019), "A Hoodie from Recycled Plastic and Coffee Grounds? Here It Is," *Sustainability Times*, https://www.sustainability-times.com/green-consumerism/a-hoodie-from-used-coffee-grounds-here-it-is/.

Speer, Matthew (2011), "What Is a Green Product?," http://www.isustainableearth.com/green-products/what-is-a-green-product.

Spencer, Steven J, Mark P Zanna, and Geoffrey T Fong (2005), "Establishing a Causal Chain: Why Experiments Are Often More Effective than Mediational Analyses in Examining Psychological Processes.," *Journal of personality and social psychology*, 89(6), 845.

Statista (2022), "Green Packaging: Estimated Global Market Value 2019 & 2025," *Statista*, https://www.statista.com/statistics/829159/global-market-value-of-green-packaging/.

Steg, Linda, Goda Perlaviciute, Ellen Van der Werff, and Judith Lurvink (2014), "The Significance of Hedonic Values for Environmentally Relevant Attitudes, Preferences, and Actions," *Environment and behavior*, 46(2), 163–92.

Strahilevitz, Michal and John G Myers (1998), "Donations to Charity as Purchase Incentives: How Well They Work May Depend on What You Are Trying to Sell," *Journal of consumer research*, 24(4), 434–46.

Su, Lei and Leilei Gao (2014), "Strategy Compatibility: The Time versus Money Effect on Product Evaluation Strategies," *Journal of Consumer Psychology*, 24(4), 549–56.

Suki, Norazah Mohd (2016), "Green Product Purchase Intention: Impact of Green Brands, Attitude, and Knowledge," *British Food Journal*.

Tahtinen, Lotta (2021), "Raising & Mapping Awareness of the Global Goals," https://www.sulitest.org/en/reports.html.

Taufique, Khan Md Raziuddin and Sridhar Vaithianathan (2018), "A Fresh Look at Understanding Green Consumer Behavior among Young Urban Indian Consumers through the Lens of Theory of Planned Behavior," *Journal of cleaner production*, 183, 46–55.

Tezer, Ali and H Onur Bodur (2020), "The Greenconsumption Effect: How Using Green Products Improves Consumption Experience," *Journal of Consumer Research*, 47(1), 25–39.

Thaller, Annina and Thomas Brudermann (2020), "' You Know Nothing, John Doe'–Judgmental Overconfidence in Lay Climate Knowledge," *Journal of Environmental Psychology*, 69, 101427.

Trope, Yaacov and Nira Liberman (2010), "Construal-Level Theory of Psychological Distance.," *Psychological review*, 117(2), 440.

——— (2011), "Construal Level Theory," *Handbook of theories of social psychology*, 1, 118–34.

Trope, Yaacov, Nira Liberman, and Cheryl Wakslak (2007), "Construal Levels and Psychological Distance: Effects on Representation, Prediction, Evaluation, and Behavior," *Journal of consumer psychology*, 17(2), 83–95.

UNESCO (2013), "Education for Sustainable Development," *UNESCO*, https://en.unesco.org/themes/education-sustainable-development.

United Nation (2018), "Higher Education Sustainability Initiative," *Green Growth Knowledge Platform*, http://www.greengrowthknowledge.org/learning/higher-education-sustainability-initiative.

"USDA Bio Program" (2016), https://www.usda.gov/media/press-releases/2016/02/18/fact-sheet-overview-usdas-biopreferred-program.

Vallacher, Robin R and Daniel M Wegner (1987), "What Do People Think They're Doing? Action Identification and Human Behavior.," *Psychological review*, 94(1), 3.

Vermeir, Iris and Wim Verbeke (2006), "Sustainable Food Consumption: Exploring the Consumer 'Attitude–Behavioral Intention' Gap," *Journal of Agricultural and Environmental ethics*, 19(2), 169–94.

Vicente-Molina, María Azucena, Ana Fernández-Sáinz, and Julen Izagirre-Olaizola (2013), "Environmental Knowledge and Other Variables Affecting Pro-Environmental Behaviour: Comparison of University Students from Emerging and Advanced Countries," *Journal of Cleaner Production*, 61, 130–38.

Vohs, Kathleen D, Nicole L Mead, and Miranda R Goode (2006), "The Psychological Consequences of Money," *science*, 314(5802), 1154–56.

——— (2008), "Merely Activating the Concept of Money Changes Personal and Interpersonal Behavior," *Current Directions in Psychological Science*, 17(3), 208–12.

Webster Jr, Frederick E (1975), "Determining the Characteristics of the Socially Conscious Consumer," *Journal of consumer research*, 2(3), 188–96.

Whelan, Tensie and Randi Kronthal-Sacco (2019), "Research: Actually, Consumers Do Buy Sustainable Products," *Harvard Business Review*, June 19, https://hbr.org/2019/06/research-actually-consumers-do-buy-sustainable-products.

Whillans, Ashley V, Aaron C Weidman, and Elizabeth W Dunn (2016), "Valuing Time over Money Is Associated with Greater Happiness," *Social Psychological and Personality Science*, 7(3), 213–22.

White, Katherine, Rishad Habib, and David J Hardisty (2019), "How to SHIFT Consumer Behaviors to Be More Sustainable: A Literature Review and Guiding Framework," *Journal of Marketing*, 83(3), 22–49.

White, Katherine, Rhiannon MacDonnell, and Darren W Dahl (2011), "It's the Mind-Set That Matters: The Role of Construal Level and Message Framing in Influencing Consumer Efficacy and Conservation Behaviors," *Journal of Marketing Research*, 48(3), 472–85.

Williams, C. G. and E. L. Deci (1996), "Perceived Competence Scales – Selfdeterminationtheory.Org," https://selfdeterminationtheory.org/perceived-competence-scales/.

Wood, Stacy L and John G Lynch Jr (2002), "Prior Knowledge and Complacency in New Product Learning," *Journal of Consumer Research*, 29(3), 416–26.

Worsley, Anthony (2002), "Nutrition Knowledge and Food Consumption: Can Nutrition Knowledge Change Food Behaviour?," *Asia Pacific journal of clinical nutrition*, 11, S579–85.

Yan, Ruoh-Nan, Karen H Hyllegard, and LaVon F Blaesi (2012), "Marketing Eco-Fashion: The Influence of Brand Name and Message Explicitness," *Journal of Marketing Communications*, 18(2), 151–68.

Yang, Defeng, Yue Lu, Wenting Zhu, and Chenting Su (2015), "Going Green: How Different Advertising Appeals Impact Green Consumption Behavior," *Journal of Business Research*, 68(12), 2663–75.

Yin, Shijiu, Mo Chen, Yusheng Chen, Yingjun Xu, Zongsen Zou, and Yiqin Wang (2016), "Consumer Trust in Organic Milk of Different Brands: The Role of Chinese Organic Label," *British Food Journal*, 118(7), 1769–82.

Zauberman, Gal and John G Lynch Jr (2005), "Resource Slack and Propensity to Discount Delayed Investments of Time versus Money.," *Journal of Experimental Psychology: General*, 134(1), 23.

Zhao, Xinshu, John G Lynch Jr, and Qimei Chen (2010), "Reconsidering Baron and Kenny: Myths and Truths about Mediation Analysis," *Journal of consumer research*, 37(2), 197–206.

Zhou, Xinyue, Sara Kim, Lili Wang, and Pankaj Aggarwal (2018), "Money Helps When Money Feels: Money Anthropomorphism Increases Charitable Giving," *Journal of Consumer Research*.

Zilahy, Gyula and Donald Huisingh (2009), "The Roles of Academia in Regional Sustainability Initiatives," *Journal of Cleaner Production*, 17(12), 1057–66.

Zsóka, Ágnes, Zsuzsanna Marjainé Szerényi, Anna Széchy, and Tamás Kocsis (2013), "Greening Due to Environmental Education? Environmental Knowledge, Attitudes, Consumer Behavior and Everyday pro-Environmental Activities of Hungarian High School and University Students," *Journal of cleaner production*, 48, 126–38.