Exploring, Understanding and Enhancing Palm Oil-Related Pro-Environmental Behaviour

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A thesis by publication submitted for the award of Doctor of Philosophy

University of New England, Armidale, New South Wales, Australia

30th April 2021

Certification of Dissertation

I certify that the ideas, data collection, results, analyses, and conclusions reported in this dissertation are entirely my own effort, except where otherwise acknowledged. I also certify that the work is original and has not been previously submitted for any other award, to this or any other university.

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15.04.2021

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Signature of Candidate Date

ENDORSEMENT

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19/04/2021

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Signature of Principal Supervisor Date

Acknowledgements

I can hardly believe that this journey has come to an end. It has been a wonderful and enriching experience that I will treasure for the rest of my life. There are several people who have played such an important role in my life these past three years.

I would first like to express my heartfelt gratitude and appreciation for my primary supervisor Associate Professor Amy Lykins. From my early interactions with her via email while I was still making decisions around perusing my PhD, Amy, you came across as warm and supportive. You were the one who encouraged me to apply for an international student scholarship and wrote me a glowing letter of support for the same. Fast forward to when I first arrived in Australia and was still figuring things out, you were on maternity leave as you had just had a baby. Despite that, you still met me the week I arrived, showed me around campus, got me sorted in my office and introduced me to colleagues. I felt very welcomed and supported, which just set the stage for the rest of my PhD journey. Amy, you have always been a source of encouragement, backing my decisions every step of the way. You were always available whenever I needed you, and your feedback on drafts was always prompt and thorough. I feel blessed to have had such a wonderful supervisor to guide and look out for me through every step of the journey.

Next, I'd like to thank my secondary supervisor Professor Don Hine. Don stepped in to provide a great deal of assistance while Amy was on maternity leave. Don, you were always incredibly patient and in a firm, yet gentle manner, nudged me towards taking time to think things through, instead of jumping into my PhD ideas (I could hardly wait to start!). You were ever available when I needed you, even after you moved universities (and countries), and took on the demanding role as Head of School. I've learnt a great deal about statistical methods from you, for which I'm very grateful. I am particularly appreciative of your constant openness and willingness to learn, which I will do my best to emulate.

I had one more supervisor join in the final year of my candidature, Associate Professor Einar Thorsteinsson. Despite being acting Head of School, Einar, you were always one of the first to respond to my queries and provide feedback on drafts. I will always remember that you were very supportive of independent thinking and ever ready to assist.

Although not officially a supervisor, I would like to mention Dr. Natasha Loi, who stepped in to assist in supervision when both primary and secondary supervisors were out of the country for a bit. Natasha, you always made time for me, were my sounding board whenever I needed it, and were particularly encouraging of my involvement in the Three-Minute Thesis competition. I'd also like to thank Dr. Suzie Cosh, especially in the context of the Qualitative Research Group she began in the School of Psychology. I've always been drawn to qualitative research and it was wonderful to have a platform to discuss ideas with like-minded individuals.

I'd be remiss if I did not thank the University of New England (UNE) for accepting me into the PhD programme, and financially supporting me with a scholarship. It had always been a dream of mine to complete a doctorate degree in an international university, and UNE helped make this come true. In this context, I'd also like to thank all the staff in the School of Psychology, who were concerned enough to check on my progress from time to time and provide me with support. I'd particularly like to thank Matthew Fernance and Chris Lisle who set up my workstation and assisted with most technological requirements.

Several staff members provided me with casual employment contracts to boost my curriculum vitae and finances. In this context, I would specifically like to thank Dr. Sue Watt, Professor Don Hine, Dr. Amanda Jefferys, and Dr. Clara Murray for the invaluable opportunities their provided. When I needed to complete certain processes in order to obtain my general registration to practice as a psychologist in Australia, the then Head of School

Professor Debra Dunstan and UNE Psychology Clinic Director Dr. Amanda Jefferys helped me enormously. I will always be grateful for their support and encouragement – thank you for believing in me.

I have immense gratitude for all my study participants, of which there were more than 1500. I would particularly like to thank all the experts who made time from their busy schedules, to participate in my Study One, and truly provided me with an in-depth understanding of the topic and what was required. Special mention to the participants in Study Two who volunteered their time to take part in interviews about their consumer habits. I also appreciate all participants who carefully filled out my online surveys – I may not know you, but I am indebted to you for your contributions to research.

I have a good number of friends who have lent support to me in various ways. Catherine Lamont and her son Nicholas Bradbury-Lamont were literally the first people we met on arrival in Armidale. They picked us up from the airport and opened the doors of their home to us. Cathy, your support in the initial months was invaluable as you played a vital role in helping us adjust to life in Australia, and life in Armidale. Lizelle Albutt was also one of the first friends we made in Armidale. Lizelle, you went out of your way to help us buy a second-hand car for which we are ever grateful! It was also refreshing to meet members of our own community when we first arrived. Pradeep Kunnath, his wife Geeta, and daughters Sharanya and Vaishnavi are like extended family members, who provided support, advise and shared holiday experiences.

I'd like to mention Wahju Prijonggo and Kaya Myeki who were the first colleagues I met in the shared office space. You guys really helped show me the ropes around the stuff like how to use the office printers, and the like. Mike Franklin is another colleague who conveyed an air of approachability and was ever ready to assist with a friendly smile. Keri

Philips, Aaron Driver, Sally Larsen, Joanne Durkin, and Nicole Allenden – I've had various interactions with you all in various context and appreciate the roles you've played in this journey of mine. I had numerous friends outside of university, who were very helpful in assisting me with testing and piloting my interviews. I would like to particularly mention to Kurt and Rebecca Langmead, Karen Everett, Vanessa Sewell, Rebecca Thew, Shjarn Winkle and Rhys Porter. Finally, I'd also like to thank my friends from Singapore and India who would keep a close tab on my progress and wellbeing. Anush Devasia, Preethi Ninan and Nisha Chandrasekar – I'm lucky to have close friends like you, with friendship that has spanned more than a decade, and survived geographical distance!

Lastly, but in no way the least, I owe a great deal to my family – the silent support that has held me up all these years. I'm grateful to my parents, and their constant encouragement when it comes to fulfilling my dreams and pursuing educational goals. Even though taking up this PhD candidature meant I would be moving to another continent, you both were nothing but supportive throughout. Dad, I will never forget the lengths you went to ensure that I can realize my dreams. Mom, I truly appreciate the way you check on me and my wellbeing every single day and how you would listen to me rant. I'd like to thank my brother, who always cracks me up with his original jokes. You have no idea how much our shared laughter has cheered me up on those difficult days. I'd like to thank my aunts and uncles who have been supportive, sometimes going out of the way to help me realize my dreams.

My husband, Anoop Alex – where do I start? You have been by my side all these years, even taking the difficult decision to pause your growing career, to come support me in my dreams here in Australia. Through ups and downs, you are the constant in this journey – my sounding board for ideas, proof-reader, venting outlet for when I am frustrated, and so much more. I certainly would not have been able to do this without you and I love you with

all my heart. Our fur babies Dora and Theo were ever-present throughout most of my writing phase and were unhesitatingly willing to provide cuddles whenever I needed it the most (and even otherwise)! You both kept me physically fit, even in the most hectic of days and are my most effective stressbusters. I love you both immensely and am so happy that we took the decisions that led you into our lives.

In loving memory of Hamish, the Westie, who brightened our mornings with his exuberant greetings, and taught us that one is never too old to change one's ways…

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Thesis Abstract

Popular, versatile, and relatively inexpensive, the oil palm crop is highly profitable for Southeast Asian economies and farmers. However, palm oil agriculture is also associated with widespread deforestation, greenhouse gas emissions, increased global temperatures, biodiversity loss, human rights violations, respiratory illnesses, and death. This thesis presents a directed line of research that aimed to: (1) explore what specific pro-environmental behaviour would be most beneficial in addressing this problem, if adopted by many Australians; (2) understand the barriers and drivers of the most effective pro-environmental behaviour; and (3) develop and test a behaviour-change intervention to enhance the target behaviour based on the barriers identified in the previous study.

A preliminary study guided by Community-Based Social Marketing (CBSM; McKenzie-Mohr, 2011) involved interviews with 11 experts to generate a list of pro-environmental behaviours that could potentially help address the palm oil crisis. This list was then sent back to the experts for an assessment of potential effectiveness in addressing the environmental destruction attributed to oil palm plantations. It was also distributed to 300 Australians from the general community to establish current penetration (i.e., how many people were already engaging in each behaviour) and probability of adoption. The results identified the most impactful behaviour to target as encouraging consumers to purchase products with sustainable palm oil (SPO).

The next study was a qualitative study that involved interviews with 13 Australian consumers to understand the range of barriers and drivers that might hinder or facilitate SPO-consumer behaviour. A subsequent online survey with 781 Australian participants was conducted using the Capability-Opportunity-Motivation model of behaviour (COM-B) of the Behaviour Change Wheel (BCW; Michie, van Stralen, & West, 2011) as a framework to determine which drivers and/or barriers would best predict SPO purchasing behaviour. A lack

of knowledge (capability) about the palm oil issue was a significant barrier to purchasing products containing SPO (explained 18% of the unique variance in SPO purchasing behaviour), along with difficulties around product availability (opportunity) and fewer pro-green consumption attitudes (motivation).

The final study involved the development and evaluation of an intervention with 628 Australians, aimed at increasing knowledge about the issue of SPO, while equipping participants with information about product availability and enhancing pro-green attitudes. In an online experiment, participants were randomly assigned to either: (1) a newly-developed interactive website on palm oil and SPO; (2) an existing promotional video on SPO; or (3) an interactive website on differentiating between real news and fake news (an attentional control condition). The results revealed that the intervention groups increased both knowledge and the intention to purchase SPO (compared to the attentional control). However, after two weeks follow up (36% attrition), there was no significant difference in self-reported SPO-related consumer behaviour among the three groups. Reduced perceived product availability might help explain this intention-behaviour gap.

Overall, it can be concluded that, in addition to increasing consumer capability and motivation, promoting sustainable consumption requires creating opportunities for people to engage in the desired behaviour. Policy-level changes are likely essential in order to address some of the structural barriers associated with inadequate opportunities for consumers to purchase SPO.

Preface

"I clutched my baby tight, and desperately looked around for something to eat. She was so little, and her bones could be seen. Barely opening her eyes, I knew she needed nourishment, and quickly. However, things had been so hard for us ever since we were driven out of our homes – our safe place – where I grew up. I felt so lost being away from the familiar. Blinded by hunger and concern for my child, I made a decision – I would go back home.

I started feeling better as I began to recognize my surroundings. Eager to arrive, I hastened my steps, anticipating the taste of sweet mangosteen. It was getting harder to see and my eyes watered from the smoke around. The air felt different, tainted by the smell of death. Although I knew I was home, I could not recognize the place. Homes had been bulldozed…there was nothing left.

I anxiously looked at my child as a wave of hopelessness threatened to engulf me. Suddenly, out of nowhere, I heard a bang and almost simultaneously felt a searing pain in my right shoulder. What followed was a blur, but there were numerous bangs, and unimaginable pain shooting through my body. I remember falling, and my child falling as well. I couldn't move, I couldn't open my eyes. I just lay there…still…wondering when the nightmare would ever end."

This is the story of Hope, a female orangutan who was shot 74 times with an airgun in 2019, which left her blinded in both eyes. She had her young, malnourished baby with her at the time of the incident, who died en route to the veterinary hospital. Hope survived despite several fractures but has to live out the rest of her days in captivity, in a body riddled with pellets (as only some of them could be removed).

Stories such as these, and viral images of an orangutan attempting to stop a bulldozer from taking down a tree, led me towards exploring the destruction of Southeast Asian rainforests. As I watched documentaries on the issue, the haunting videos of the red and yellow toxic skies, the descriptions of human infants suffering from brain damage, and the stories of indigenous communities being displaced from their homes, also touched me deeply. The more I learnt about the ramifications of this destruction, the more certain I was that this was a topic that I wished to research.

One of the main drivers of Southeast Asian deforestation is the growing palm oil industry, which is driven by consumer demand. Palm oil is estimated to be found in over 50 per cent of supermarket products. If only we could alter consumer habits, and subsequently the demand for these products, perhaps we could do something about this devastation of the environment and planetary life – human, plant, and animal.

CHAPTER ONE

General Introduction

Human-driven deforestation is a growing concern for a variety of reasons. Despite the commitments made by several companies and governments to decrease deforestation by the year 2020, the year 2019 actually witnessed an increase in the worldwide destruction of tropical rainforests (Fountain, 2020). Tropical rainforests play an essential role in regulating water cycles, and subsequently global and local temperatures (Wolosin & Harris, 2018). Therefore, deforestation is inextricably linked to accelerated climate change (Union of Concernced Scientists, 2016; Wolosin & Harris, 2018).

Increasingly, attention is being turned towards the role of agriculture in climate change (Pendrill et al., 2019; Rohila et al., 2017), with beef, soybean and palm oil production identified as several of the top drivers of global deforestation (Union of Concernced Scientists, 2016). Since the late 1960s and early 1970s, there has been concern about the rates of human consumption (food, water, energy and other natural resources) being unsustainable, leading to potential irreparable damages to the environment and in return to people (Ehrlich, 1968; Fisk, 1973; Meadows et al., 1972). In his paper, "Criteria for a theory of responsible consumption" Fisk (1973) warned of an impending "population crash" and advocated for developed countries to markedly reduce consumption in the hope of achieving a symbiotic relationship between humans and the environment. Almost 50 years have passed, and yet the urgency and the message remain the same – current land use and patterns of consumption need to change in if we are to tackle the world's environmental challenges successfully, particularly with our rapidly growing world population demanding higher and higher standards of living (Colombo, 2001; Rockström et al., 2009; Ruby et al., 2020).

The situation is complex because while the ecological impact of unchecked consumption is alarming, there is also parallel concern about ensuring economic growth and progress in developing countries (Fisk, 1973; Ruby et al., 2020). This conflict between economic advancement and environmental degradation is aptly illustrated by the palm oil crisis.

Palm oil is a relatively inexpensive, versatile, and popular oil that is targeting the growing demand for edible oil, brought upon by increased consumerism and global wealth, wide-spread urbanization and changing lifestyles (Lee et al., 2016; Meijaard et al., 2018). An examination of food consumption trends over the past 50 years has revealed an increase in vegetable oil consumption across the world (Kearney, 2010), thought to be linked to the increasing consumption of convenience, processed and "junk" food (Brunner et al., 2010; Lee et al., 2016). For the rural farmers in palm oil producing countries like Indonesia and Malaysia, growing and tending to oil palm plantations has provided a much-needed boost to their livelihoods (Meijaard et al., 2018).

However, oil palm plantations grow in tropical regions, with growing sizes and numbers of plantations necessitating the clearing of tropical rainforests for land (Gilbert, 2012). The Southeast Asian rainforests are not only experiencing deforestation, but also peat degradation, forest fires, biodiversity loss and species extinction as a result of palm oil expansion (Koh & Wilcove, 2009; Meijaard et al., 2018; Meijaard & Sheil, 2013; Sheil et al., 2009). Figure 1 shows the loss in primary forests in the island of Borneo between 1973 and 2016 (Gaveau, 2017). With an estimate of 300 football fields of forests being cleared every hour for oil palm plantations (The Orangtuan Project, 2019), this devastation is alarming and necessitates urgent action.

Figure 1.1 Forest cover in Borneo island (Indonesia, Malaysia and Brunei) in 1973 and in 2016 indicating the extent of deforestation. Reprinted from "What a difference 4 decades make: Deforestation in Borneo since 1973," by D. L. A. Gaveau, 2017 (http:www.cifor.org/publications/pdf_files/factsheet/6552-factsheet.pdf). Copyright [2017] by Center for International Forestry Research (CIFOR), Bogor, Indonesia. Used under Creative Commons Attribution License: https://creativecommons.org/licenses/by/4.0/

Thesis Aims and Objectives

The demand for palm oil is driven by human consumption, with over 80% grown for food consumption; the rest is used in biodiesel, cosmetics and pharmaceuticals (Shimizu & Desrochers, 2012). Given the widespread ecological destruction associated with palm oil and the lack of clear direction on what potential solutions exist, this thesis aimed to understand and enhance pro-environmental behaviours (PEB) specific to addressing the palm oil crisis. The objectives of this research were to:

- To understand which palm oil-related PEBs (e.g., making responsible consumer choices, volunteering, donating money, engaging in activism, etc.) would have the

most impact on reducing palm oil-related deforestation, while also being behaviours that people are likely to engage in but are not already performing;

- To explore internal (person-centric) and external (situational) factors that increase or decrease the likelihood of engaging in the target palm oil-related PEB;
- To identify which factors best predict engagement in the target palm oil-related PEB; and
- To design, implement and evaluate a behaviour change intervention with the aim of increasing the target palm oil-related PEB.

Thesis Structure

The above stated objectives were addressed by conducting a series of five studies that were sequential in nature and reported in four stand-alone articles. Four of these articles have been submitted to relevant peer-reviewed journals, out of which one has been published, and three are under review. Figure 2 (see below) portrays the logical progression of these studies. In this thesis, each article is presented as a separate chapter. In order to explain the logic of research progression across the chapters, a summary explaining the transition will be included, thus linking all the chapters. The framework of the thesis is as follows:

Chapter Two. A literature review on the various dimensions of the palm oil crisis, as well a detailed look at the various factors relating to the palm oil crisis. These factors are discussed using the Capability-Opportunity-Motivation model of understanding Behaviour (COM-B), derived from the Behaviour Change Wheel (BCW; Michie et al., 2011). Further, as a majority of palm oil is used for human food consumption, factors that have been highlighted in research on 'green', 'sustainable', and 'ethical' consumerism and purchasing behaviour are also reviewed. Behavioural interventions in the pro-environmental space are briefly explored as well. Finally, the scarcity of research in environmental psychology

pertaining to the palm oil crisis is highlighted, and the chapter concludes with explaining the rationale for the current directed line of research.

Chapter Three. Study 1 and Study 2 were preliminary studies which aimed to assess which palm oil-related PEB (that a lay individual can perform) would have the greatest influence on addressing the palm oil crisis (i.e., decreasing its ecological impact, while seeking to maintain the livelihoods of rural farmers who rely on oil palm plantations for their livelihoods). Study 1 consisted of generating a list of potential palm oil-related PEB that Australians could engage in, by interviewing experts in the field (conservation scientists, researchers, activists and environmental journalists). Study 2 surveyed these experts and a representative sample of Australian adults, obtaining ratings on effectiveness of each behaviour, probability of adoption and existing penetration (i.e., how often people already performed this behaviour). These data were used to compute a Behaviour Prioritization Matrix (McKenzie-Mohr, 2011), which allowed the selection of a target palm oil-related PEB, which was purchasing products that contained sustainably sourced palm oil.

Chapter Four. Study 3 was a qualitative study that aimed to explore the various barriers and drivers that Australian consumers might face when deliberately purchasing products that contain sustainable palm oil (SPO), while avoiding products that contain unsustainable palm oil. The interviews were subjected to framework analysis utilising the Capability-Opportunity-Motivation model of understanding Behaviour (COM-B; Michie et al., 2011). Several aspects of capability, opportunity and motivation that play a role in the decision-making around SPO-related consumer behaviour were identified.

Chapter Five. Study 4 was an online survey with a large, representative sample of Australians, that aimed to understand the factorial structure underlying the barriers and drivers identified in Study 3, using exploratory factor analysis. This study also aimed to

identify which of these factors best predicted engagement in SPO purchasing behaviour. Possessing knowledge about the palm oil issue, ease of access and perceived availability of SPO products, as well as having "green" attitudes (e.g., concern about the environment) emerged as significant predictors of purchasing products containing SPO.

Chapter Six. Study 5 was a culmination of the preceding studies, using the data gathered to design an appropriate large-scale online intervention to increase SPO-related consumer behaviour. Participants either viewed: (a) an interactive website on palm oil (created specifically to address the factors identified as significant predictors in Study 4); (b) existing promotional material on palm oil in a video format; or (c) a neutral interactive website. Pre-test measures, post-test measures and follow-up measures were administered to determine the effectiveness of the designed intervention by comparing its results to those of the other two groups. While the designed palm oil interactive website did significantly increase knowledge about the palm oil issue, and subsequently the intention to purchase more products containing SPO, there was no significant difference between the three groups with respect to follow-up behaviour. The potential explanations behind these results are examined.

Chapter Seven. This concluding chapter summarizes the results of the preceding chapters, while comparing how they relate to and expand on existing literature. The implications of this research, its limitations, and future directions are discussed.

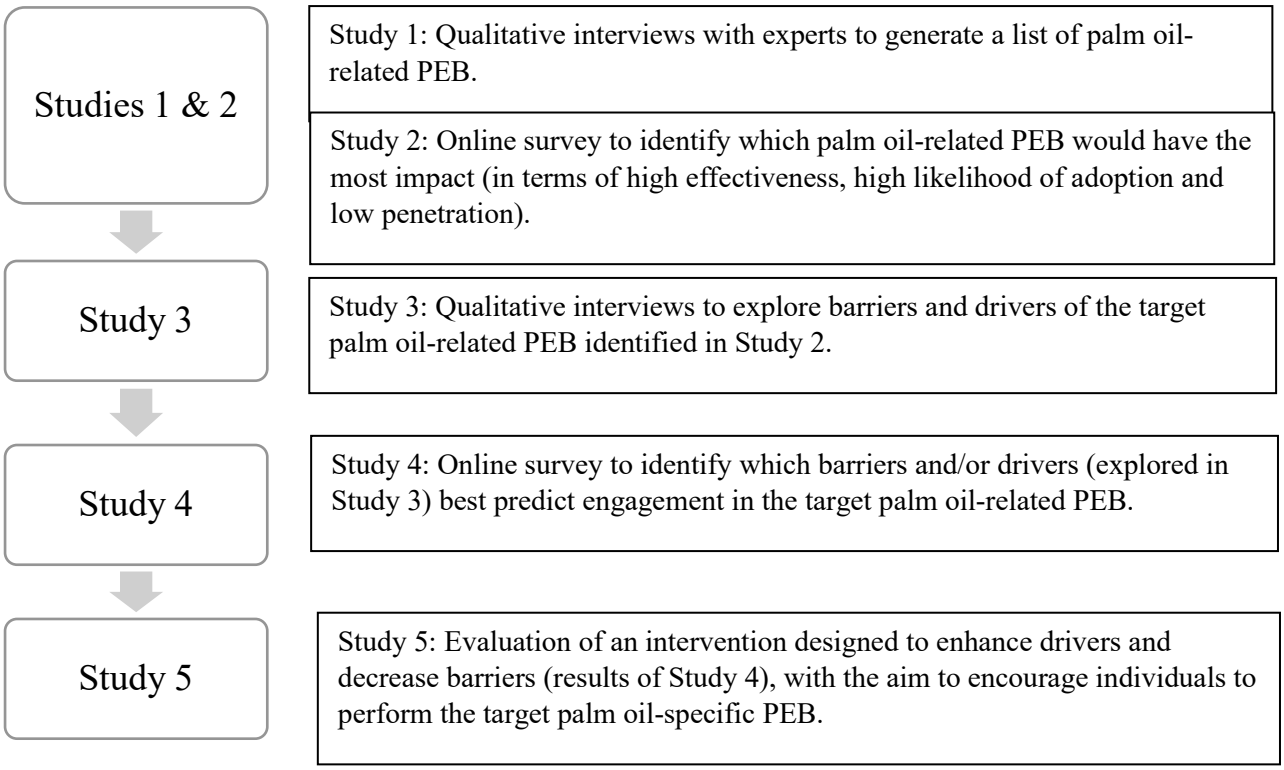

Figure 1.2. Logical progression of research studies that constitute this thesis.

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CHAPTER TWO

Literature Review

Palm Oil

Originating from West Africa, palm oil, derived from *elaeis guineensis*, has gained popularity due to its versatility, high yield (when compared to all other oilseed crops) and relatively low production cost (Meijaard et al., 2018). The oil palm crop flourishes in tropical regions and is now a thriving market in Southeast Asia, particularly Indonesia and Malaysia (Sheil et al., 2009). The global rising demand for edible oils, like palm oil, is fuelled by increasing per capita incomes, growing consumerism and changing lifestyles (Meijaard et al., 2018; OECD & FAO, 2018). It has been reported that about 80 to 90 per cent of palm oil is produced for human food consumption, and 10 per cent is consumed by various industries, such as biodiesel, cosmetics and pharmaceutics (Shimizu & Desrochers, 2012).

In 2008, Indonesia was producing over 18 million metric tonnes of palm oil annually (World Growth, 2011), and by 2017-2018, this number had reached 36.5 million metric tonnes (Wright & Rahmanulloh, 2017). With the global demand for palm oil at an all-time high, palm oil production in Indonesia had been projected to reach 60 million tonnes annually by 2020 (World Growth, 2011). In fact, by 2019, the global palm oil market was estimated to be 74.6 million tonnes (Grand View Research, 2020), further expected to increase to 111.3 million tonnes by the year 2025 (Research and Markets, 2019). This rise is linked to the overall global food demand required to sustain a rapidly growing human population (Fróna et al., 2019). This population growth is anticipated to be the largest in developing countries, particularly in South Asia and Sub-Saharan Africa (estimated to grow by approximately another 2.4 billion people by 2050; Fróna et al., 2019).

It is important to note here that many of the developing countries struggle with poverty, and large numbers of people living in rural low-income regions rely on agriculture for sustenance (Fróna et al., 2019). In light of this, the palm oil industry has contributed to Indonesia's economy and poverty alleviation, as palm oil is its most significant agricultural export (World Growth, 2011). It offers opportunities of livelihoods in these producing developing countries and is a major source of income for many rural communities (Lee et al., 2013). While corporate plantations produce a majority of palm oil in Indonesia (49%), approximately 40 per cent is obtained from smallholder farms, which are run as family farms (Meijaard et al., 2018; World Growth, 2011).

Palm Oil Crisis

This socio-economic advancement is regrettably occurring at a huge cost, and has been associated with a number of environmental concerns and social conflicts (Koh & Wilcove, 2009; Meijaard & Sheil, 2013; Sheil et al., 2009). The ecological and humanitarian concerns listed below can be collectively referred to as the "palm oil crisis".

Ecological Impact. In order to further its production, the Indonesian palm oil industry has been replacing large areas of rainforests and peatlands with palm oil plantations, leading to deforestation, peat degradation, biodiversity loss and species extinction, forest fires and a range of associated social issues (Koh & Wilcove, 2009; Meijaard & Sheil, 2013; Sheil et al., 2009). Between 1990 and 2015, almost 25 per cent of Indonesia's rainforests had been destroyed (World Bank, 2018), a large proportion of which is attributed to the planting of oil palm plantations (Gilbert, 2012; Koh & Wilcove, 2008). This deforestation has negatively impacted the biodiversity in Southeast Asia (Koh & Wilcove, 2008), and has led to the critical endangerment of several native species, including the orangutan, Sumatran tiger, pygmy elephant and sun bear (Meijaard & Sheil, 2013). Orangutan numbers have drastically

declined and they are predicted to be the first of the great apes to face extinction in a few decades (Wich et al., 2008). A 16-year study (1999 to 2015) in Borneo, Indonesia, revealed that an estimated 150,000 orangutans had been lost during this period, reducing the entire population of Bornean orangutans to less than half of the original number as to when the study began (Sample, 2018).

Further, tropical rainforests also have direct environmental benefits such as reducing the surface temperature, assisting with water retention, and preventing floods (Meijaard et al., 2013; Wolosin & Harris, 2018). Therefore, rainforest loss has been directly linked with global climate change, not only through the carbon dioxide emissions of deforestation, but also by disrupting rainfall and increasing surface temperatures (Pearce, 2018). In plants and trees, moisture is carried from their roots to small pores on the underside of leaves, where it is released into the atmosphere as vapour. This is referred to as transpiration, and is responsible for a tree's cooling effect on the surrounding air, as it extracts energy for this process (Ellison et al., 2017). A study examining surface temperatures in the Jambi province of Indonesia, has recorded an average increase 1.05°C over 16 years (2000 to 2016), noting that there was a surface temperature difference of 10.1 ± 2.6°C between forested and cleared lands (Sabajo et al., 2017). More recent research has revealed that the Southeast Asian rainforests are one of three main belts of tropical rainforests (the other two being the Congo basin and the Amazon rainforests), which play an essential role in regulating water cycles, and in turn, both local and global temperatures (Wolosin & Harris, 2018).

Impact on Human Health. The employment of the popular slash and burn technique to clear forests is linked to significantly increased greenhouse gas emissions (Sheil et al., 2009), specifically carbon-dioxide (Basyuni et al., 2018), driving Indonesia's status as the third largest emitter of greenhouse gases in the world (Peace, 2007). The resultant Southeast

Asian Haze (affecting not only Indonesia, but also Malaysia, Singapore, and to a lesser degree the Philippines and Thailand), attributed to the burning of peatlands, has created health risks, particularly respiratory illnesses, among these countries' inhabitants (Islam et al., 2016; Varkkey, 2012). In fact, in 2015 alone, these peatland fires and the subsequent haze were responsible for an estimated 100,300 premature deaths in these countries, and the pollution generated daily has been estimated to be greater than that emitted by the entire United States of America per day (Higonnet et al., 2016). However, more recent literature has emphasized that by halting the draining of peatlands, and focussing on peat restoration efforts, greenhouse gas emissions can be significantly reduced (Humpenöder et al., 2020).

Additionally, the loss of forest cover through deforestation negatively impacts the people who depend on these forests directly and indirectly. In a large study involving approximately 5400 interviews with residents across over 700 villages on the island of Borneo, Meijaard et al. (2013) found that local communities rely on forests for food and medicine, as well as for cultural and spiritual purposes. While these village inhabitants acknowledge that small-scale clearing of the land and forests is essential for agricultural purposes and sustenance, large-scale deforestation (like that associated with oil palm plantations) is detrimental to their health and livelihoods (Meijaard et al., 2013).

Human Rights Violations. Further to the ecological and health implications, the Indonesian government has been accused of human rights violations against local indigenous communities. Indonesian legislation allows for the State to acquire controlling power over natural resources to be allocated for the benefit of local communities. However, in several known cases, this authority is reportedly being abused and local lands are being acquired without due payment or remedies (Colchester, 2011). This activity results not only in the destruction of cultural sites (e.g., ancestral burial grounds), but also contaminated water

sources, dependence on a single crop, inadequate livelihood opportunities, and a vicious cycle of debt for the locals (Friends of the Earth et al., 2011). In addition, some oil plantations have been accused of violating the rights of their employees and engaging in child labour. There have been several reports of children as young as eight years of age engaged in harsh physical labour, and workers being paid wages that are below the minimum requirement (Amnesty International, 2016). Added to this, employees have complained about long working hours to meet extremely rigorous targets and a lack of adequate safety measures while spraying herbicide, leading individuals (mostly women) to be exposed to toxic chemicals such as paraquat (Amnesty International, 2016; Friends of the Earth et al., 2011). Specific plantations have been also accused of gender discrimination, hiring only men as permanent employees and restricting women to only casual employment, which denies them social security benefits such as pensions and health insurance (Amnesty International, 2016).

Potential Solutions

In their paper on "Addressing the threats to biodiversity from oil-palm agriculture", Wilcove and Koh (2010) postulate a number of suggestions for environmentalists to counter the threat posed by the palm oil crisis. These include advocating for increased regulations (like a ban on deforestation of primary rainforests), financial incentives to oil palm businesses that would encourage them to adopt more sustainable practices, and financial disincentives to oil palm businesses as driven by consumer pressure for sustainable practices (Wilcove & Koh, 2010). They acknowledge that it is unlikely that there would be one single best solution to handle the palm oil crisis—which contains both macro- and micro-level economic pressures and potential solutions—but a combination of the above-mentioned suggestions might be most successful in reducing the ecological destruction propagated by the unsustainable palm oil industry (Wilcove and Koh, 2010). More recently, technological

solutions including the manufacture of a synthetic oil that can replace palm oil, are being worked upon, but are still a long way off from being financially viable (Parsons et al., 2020).

Consumers can be an important driving force at both the macro- and micro-levels, by pushing for more regulations in the industry, and by exercising their consumer power to incentivise and/or disincentivise manufacturers with their purchasing decisions. This can be done in two possible ways:

Boycotting Palm Oil. From the discussion above, it might seem that most of these concerns would disappear, should palm oil be banned or boycotted among the masses. However, this could not be further from the truth (Bicknell et al., 2018; Walden, 2018). Owing to its efficiency over other oilseed crops, its penetration into the global economy and high profit margins, it is impractical to expect the production of oil palm to cease (Meijaard et al., 2018; Wilcove & Koh, 2010). The main criticism against a total ban is that palm oil has the greatest land-use efficiency among all other oilseed crops, and should another oil be used to replace palm oil, it would only result in increased crop-related deforestation elsewhere (Meijaard et al., 2018). Further, a boycott of palm oil would have a devastating impact on smallholders, who rely on this thriving monoculture to feed their families and educate their children (Meijaard et al., 2018; Sheil et al., 2009). Finally, palm oil is widely used in several products, but is not always labelled as so. In fact, in Australia, palm oil need not be specifically labelled, and can continue to be subsumed under the generic term 'vegetable oil', after an application to change this policy was rejected (FSANZ, 2017). Researchers have postulated that encouraging sustainability (i.e., sourcing palm oil from plantations that have not replaced existing forests) at different levels: smallholders, medium to large plantations, companies, retailers and consumers, is the potential solution to this crisis (Meijaard et al., 2018; Parsons et al., 2020; Wilcove & Koh, 2010).

Support Sustainable Palm Oil (SPO). With the aim of sustainability, the Roundtable for Sustainable Palm Oil (RSPO) was formed in 2004. The RSPO is a non-governmental organization whose stakeholders include producers, traders, consumers and investors in the palm oil industry (RSPO, 2018a). The RSPO has been promoting the use of certified *sustainable* palm oil—that which is responsibly sourced from plantations that ensure that areas of High Conservation Value (HCV) are not deforested, that areas and peatlands of High Carbon Stock (HCS) are not cleared nor drained, that fire is not used to deforest the land to be used for plantations, and that fair labour practices are enforced. However, there are mixed reviews about its success. Research has demonstrated that although RSPO certification has reduced deforestation, this was mainly seen in plantations that had little or no forests left within them prior to certification (Carlson et al., 2018). Some of these biodiverse-rich tropical forest areas provided habitats to large mammals as recent as 30 years ago, before they were cleared for oil palm plantations that are presently labelled as "certified sustainable" (Cazzolla Gatti & Velichevskaya, 2020). Furthermore, there appeared to be no significant difference between RSPO certified and non-certified concessions (areas allocated by a government for industrial-scale oil palm plantations) on metrics of environmental, social and economic sustainability (Morgans et al., 2018). Additionally, the RSPO has been accused of "greenwashing" (Lang, 2015; Rahmawati, 2014), which refers to "the act of misleading consumers regarding the environmental practices of a company or the environmental benefits of a product or service" (Zudonya, 2011). Following this, the RSPO Complaints Panel commissioned a field review and promised to look into violations (Lang, 2015). By the end of 2018, the RSPO's Principles and Criteria document underwent a revision which promised more stringent standards (RSPO, 2018b). Although it was hoped that these revisions will be implemented enforced, and monitored rigorously (Lyons-White & Knight, 2018), early investigations into some of the RSPO-certified plantations have not shown promising results

(Environmental Investigation Agency & Grassroots, 2019). However, despite its shortcomings, creating a growing market for SPO is heralded by many in the field as the middle-ground solution, minimizing harm to human, animal and plant life (Meijaard et al., 2018; Parsons et al., 2020; Wilcove & Koh, 2010).

Pro-Environmental Behaviour

Given that the consumption of unsustainable palm oil contributes to environmental degradation, biodiversity loss, and climate change, research on pro-environmental behaviours and associated behaviour change interventions was explored. Literature in the area of pro-environmental behaviour (PEB) has been growing, particularly over the last three decades. However, there is very little that has been done in the palm oil space. As such, this review will cover studies done broadly with respect to 'PEB', 'environmental sensitivity', 'environmentally responsible behaviour', and 'green behaviour', with a focus on 'green purchasing behaviour' and 'sustainable consumption', as a majority of palm oil is used in consumer products (Shimizu & Desrochers, 2012).

Next, there are various theoretical frameworks that have been used to understand PEB, including what factors might lead an individual to engage or not engage in various PEB, the most notable one being the Theory of Planned Behaviour (TPB; Ajzen, 1991). However, frameworks like the TPB explore only intrinsic factors in relation to PEB. A more comprehensive framework called the Behaviour Change Wheel (BCW; Michie et al., 2011) takes into consideration various internal *and external* factors that can influence successful performance of an intended action. Therefore, the BCW, as well as intrinsic and extrinsic variables relating to PEB and green consumption are discussed in this review. The variables or contexts explained are those that have been identified as significant in meta-analyses (Bamberg & Möser, 2007; Hines et al., 1987), have been given attention by several

researchers, or appear to have relevance to promoting environmentally responsible behaviour change in the modern world. Finally, specific research relevant to the palm oil crisis will be discussed.

Key Definitions

Kollmuss and Agyeman (2010) have defined 'pro-environmental behaviour (PEB)' as "behaviour that consciously seeks to minimize the negative impact of one's actions on the natural and built world (e.g., minimize resource and energy consumption, use of non-toxic substances, and reduce waste production)". Subsequently, palm oil-related PEB can be defined as "any conscious action taken to minimize support given to the unsustainable palm oil industry, while increasing support given to industries that follow strict no deforestation policies, as well as contributing in terms of time, energy, resources and/or finances towards problem-solving of this crisis (increasing public awareness, reforestation efforts, rehabilitation of endangered species, etc.)". Further, green consumption, as defined by the Cambridge Business English Dictionary ("Green consumerism," 2019), is the purchasing and consumption of products that have been produced in a manner that protects the natural environment. Although sometimes used interchangeably (Hanss et al., 2016), sustainable consumption can be subsumed under green consumerism (Ponting, 2011). Sustainable consumption is "the use of goods and services that respond to basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the lifecycle, so as not to jeopardise the needs of future generations" (Oslo Symposium, 1994).

Behaviour Change Wheel

Numerous theories have been developed in an attempt to explain behavioural decisions or behaviour change. However, none of them are sufficiently comprehensive,

leading to a dearth of systematic interventions (Michie et al., 2011). Considerable research has focussed on ways to motivate behaviour that often ignores practical realities and other barriers to successful performance of such behaviour. Proposed by Michie et al. (2011), the behaviour change wheel (BCW) aims to improve intervention design by providing a "systematic method that incorporates an understanding of the nature of the behaviour to be changed, and an appropriate system for characterising interventions and their components that can make use of this understanding" (Michie et al., 2011). Prior to developing interventions, it is important to initially begin with a comprehensive and coherent model of behaviour that takes into consideration both internal and external behavioural influencers, to understand what needs to be targeted. Therefore, the inner layer of the wheel represents a model wherein capability, opportunity and motivation (COM-B) all interact in varying proportions, in a non-hierarchical manner, to produce or prevent specific behaviours (Michie et al., 2011).

These components can further be sub-divided as follows:

1. Capability can be physical (such as having the physical skills necessary to perform the behaviour) and/or psychological (which includes knowledge, cognitive skills and the capacity to regulate behaviour).
2. Opportunity can be physical (referring to environmental resources and contexts) and/or social (the influence of society).
3. Motivation, which can be automatic (under which emotions and rewards fall) and/or reflective (components of evaluation for decision-making including intentions, goals, self-efficacy, etc.).

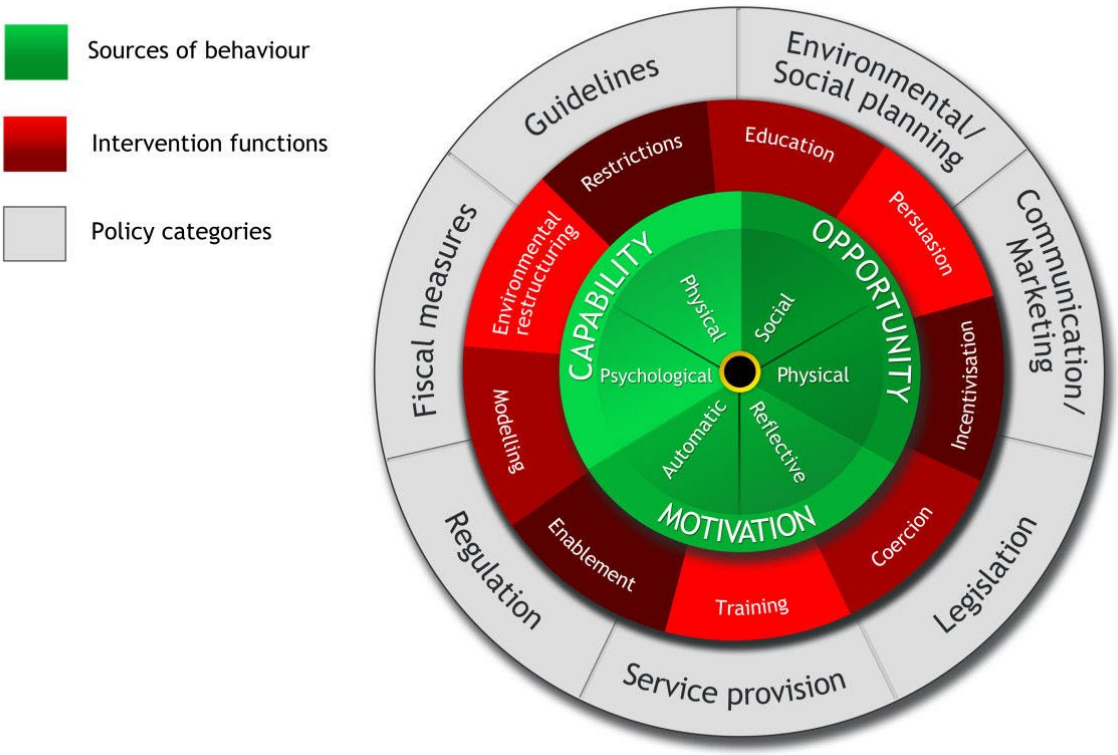

Figure 2.1. The behaviour change wheel. Reprinted from "The behaviour change wheel: A new method for characterising and designing behaviour change interventions," by S. Michie, M. M. van Stralen and R. West, 2011, *Implementation Science, 6*(42), p. 7. Copyright [2011] by Michie et al., licensee BioMed Central Ltd. Used under Creative Commons Attribution License: http://creativecommons.org/licenses/by/2.0

Michie et al. (2011) believe that all these components are necessary for performing a particular behaviour, except perhaps reflective motivation, which is relevant in some contexts but not others. Using this framework and reviewing the extant relevant literature, the next two layers of the behaviour change wheel were identified – nine types of interventions and seven policy categories which correspond to one or more behavioural components. These are summarised in the table below:

Table 2.1

Definitions of interventions

Intervention	**Definition**	**Examples**
Education	Increasing knowledge or understanding	Providing information to promote healthy eating
Persuasion	Using communication to induce positive or negative feelings or stimulate action	Using imagery to motivate increases in physical activity
Incentivisation	Creating expectation of reward	Using prize draws to induce attempts to stop smoking
Coercion	Creating expectation of punishment or cost	Raising the financial cost to reduce excessive alcohol consumption
Training	Imparting skills	Advanced driver training to increase safe driving
Restriction	Using rules to reduce the opportunity to engage in the target behaviour (or to increase the target behaviour by reducing the opportunity to engage in competing behaviours)	Prohibiting sales of solvents to people under 18 to reduce use for intoxication
Environmental restructuring	Changing the physical or social context	Providing on-screen prompts for GPs to ask about smoking behaviour
Modelling	Providing an example for people to aspire or imitate	Using TV drama scenes involving safe-sex practices to increase condom use
Enablement	Increasing means/reducing barriers to increase capability or opportunity [1]	Behavioural support for smoking cessation, medication for cognitive deficits, surgery to reduce obesity, prosthesis to promote physical activity

[1] Capability beyond education and training; opportunity beyond environmental restructuring

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Table 2.2

Definitions of policies

Policies	**Definition**	**Examples**
Communication/ marketing	Using print, electronic, telephonic or broadcast media	Conducting mass media campaigns
Guidelines	Creating documents that recommend or mandate practice. This includes all changes to service provision	Producing and disseminating treatment protocols
Fiscal	Using the tax system to reduce or increase the financial cost	Increasing duty or increasing anti-smuggling activities
Regulation	Establishing rules or principles of behaviour or practice	Establishing voluntary agreements on advertising
Legislation	Making or changing laws	Prohibiting sale or use
Environmental/ social planning	Designing and/or controlling the physical or social environment	Using town planning
Service provision	Delivering a service	Establishing support services in workplaces, communities, etc.

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It is important to remember that governments and industries have a major role to play with respect to barriers to pro-environmental action, and therefore policy-level change is essential (Chawla & Cushing, 2007; Gardner & Stern, 2002). In the context of the BCW, several factors identified by research will be described, following which relevant intervention research will be reviewed.

Physical Capability. Physical capability refers primarily to possessing the physical skills required to perform a particular task, or the actual behavioural control that an individual may have (Ajzen, 1991). For example, in the context of consumer behaviour, education,

skills in home management that may enable certain consumer behaviour, and economic conditions can influence 'green' behaviour (Stern, 1999). In today's world, personal resources of time and money (the lack thereof) can be significant barriers towards engaging in pro-environmental behaviour (Quimby & Angelique, 2011; Young et al., 2010). Therefore, one's economic capacity can also refer to the time and effort that is required to educate oneself and research products for consumption (Gleim et al., 2013). Higher product price has been identified as a significant obstacle to green purchasing behaviour (Bray et al., 2011; Ghvanidze et al., 2017; Joshi & Rahman, 2015). Further, research has shown that more than having pro-environmental attitudes, the price of sustainable products and being willing to pay more for environment-friendly products are more likely to predict making 'green' purchases (Barbarossa & Pastore, 2015; Moser, 2015). It is reasonable to assume that a prerequisite to willingness to pay more is having the capacity to pay or afford more environmentally-friendly alternatives (which may be more expensive than the non-environmentally-friendly comparison products).

Physical ability can be increased by the training of specific skills, or enablement (Michie et al., 2011). One manner of enablement could be the use of technology. It should be noted that advancements in technology have also been blamed for the increasing environmental concerns, as when human behaviour is augmented with technology, there tends to be an increase in the consumption of natural resources (Kaiser & McCalley, 2007). The general consensus though is that if utilized appropriately, technology can facilitate environmentally responsible behaviour by serving to obstruct unsustainable actions or facilitate pro-environmental ones, making a particular device or action more or less appealing (Kaiser & McCalley, 2007). However, not everyone is comfortable operating technology and a study on the adoption of technical measures or behavioural measures among adults in Malaysia found out that men with higher incomes—who are also more educated, have

requisite knowledge about climate change, and have positive attitudes toward technology—are more likely to adopt technical measures (Aini et al., 2013).

Psychological Capability. In order to engage in any kind of PEB, awareness is necessary. Interviews with environmentalists in the United States of America and Norway have emphasized the importance of being well-informed about environmental issues, not necessarily through formal means (Chawla, 1999). Knowledge about an environmental issue, possible actions to take, and their consequences, were identified as significant factors in a seminal meta-analytic study by Hungerford and Volk (1990). Specific to ethical consumption, lack of adequate information or knowledge was identified as an important barrier, with consumers relying on whether brands got "bad press" to inform their decision-making (Bray et al., 2011). Apart from knowledge (Young et al., 2010), comprehension, reasoning and remembering that information at the time of decision-making are important, as is the capacity to monitor and regulate one's own behaviour (Michie et al., 2011). Suffering from psychological illnesses can also potentially decrease an individual's psychological capability (McLeod et al., 2015).

Psychological capability can be enhanced primarily by education, as well as training and enablement (Michie et al., 2011). Self-education about facts surrounding the environmental issue and how to resolve it, as well as knowledge about the economic and political perspectives, are important (Chawla, 1999). In a detailed review, Chawla and Cushing (2007) evaluated strategies in the context of education for environmental action, and they concluded that at present, environmental education typically focuses mainly on private sphere environmentalism (e.g., recycling, composting, etc.), instead of assisting individuals to engage in strategic public action. In their book, Gardner and Stern (2002) argue that on their own, private actions may not be as successful as combining private actions with collective

actions, such as encouraging change at the government and industry level (e.g., petitions, campaigns, etc.). Technology is also playing an increasingly vital role with respect to multimedia, generating awareness and communicating information. The use of immediate feedback has been found useful in energy conservation (Kaiser & McCalley, 2007). Specifically with respect to behavioural regulation, an innovative interventional research utilized a virtual pet game, called *Energy Chickens,* among commercial office workers in USA, which aimed to reduce energy consumption (Orland et al., 2014). The game was designed such that real-time usage of participants' devices was used to give feedback regarding the health of the pet chicken, so when energy savings had improved, so did the chicken's health, leading to rewards. This game was found to significantly reduce energy use, although this reduction in usage was not sustained long-term (Orland et al., 2014). Thus, feedback and information alone, however carefully designed, may only impact PEB to a modest extent, and so the most effective interventions would also need to focus on social influences and institutional supports, as well as some incentives (Stern, 1999)

Physical Opportunity. Physical opportunity refers to the actual available environmental resources available to the individual. For example, the mere presence of numerous trash receptacles makes littering less likely for everyone (Kaiser & McCalley, 2007), and the availability of public transport facilitates the use of public transportation (Kollmuss & Agyeman, 2010). Discussing opportunities in the context of consumer behaviour is also important, as changing consumer behaviour can make a significant impact on the environment despite situational restraints that may be present (Stern, 1999). Consumer behaviour falls under the category of private-sphere behaviours (Gardner & Stern, 2002; Stern, 1999), and can be divided into different sectors (e.g., household, transportation, etc.). Survey research has revealed that even though consumers may have general environmental concern, this concern does not always translate into a marked influence on their beliefs about

their environmental responsibility or their purchase choices (Mainieri et al., 1997; Young et al., 2010). Knowledge of environmental issues, pro-environmental values, necessary purchase experiences, as well as sufficient time for research and decision-making, may be insufficient if there is limited availability of environment-friendly alternatives and a lack of financial freedom (Barbarossa & Pastore, 2015; Young et al., 2010). Reduced availability of green products and complex eco-labelling pose significant barriers to sustainable purchasing behaviour (Joshi & Rahman, 2015; Nguyen et al., 2019). Further, even the perceived unavailability of sustainable products has been found to lower intentions to purchase them, despite possessing favourable attitudes (Vermeir & Verbeke, 2006).

In order to encourage responsible consumer behaviour, it is essential to remove barriers that are outside the consumers' control (Stern, 1999). Restriction, environmental restructuring and enablement are suggested interventional functions to target physical opportunity (Michie et al., 2011). Placing trash receptacles in accessible and convenient locations is an example of environmental restructuring, while the ban on plastic bags in some countries (Riskey, 2017) is an example of restriction. Recent inventions such as creating edible cutlery (Flynn, 2016) and a substitute for plastic bags made of potato and tapioca (Bearne, 2018) all help in creating opportunities for more sustainable choices.

Social Opportunity. The culture to which a person belongs plays a large role in his or her choices and behaviour, specifically when the desired behaviour requires co-operation (Ajzen, 2005). Research has shown that the country of origin and the specific values and norms associated with that particular culture do play a role in determining pro-environmental behaviour (Culiberg & Elgaaied-Gambier, 2016; Vicente-Molina et al., 2013). Specifically, the role of social norms, referring to what is commonly done or is socially sanctioned, has been highlighted (Cialdini et al., 1991; Joshi & Rahman, 2015), and can vary from culture to

culture. Social norms can be either descriptive or injunctive (Cialdini et al., 1991), the former referring to what people actually do, and the latter to prescriptions of what ought to be done or the moral rules of the group. Distinguishing between descriptive and injunctive norms is important, as in a given situation, they can have either congruent or contradictory implications on behaviour (Cialdini et al., 1990). In several well-known studies on littering, Cialdini et al. (1990) demonstrated that when activated, norms can differentially impact action depending on whether they are descriptive or injunctive (if there are any congruent or contrary effects) and if the individual's focus of attention is drawn to the operating norm. If the descriptive and injunctive norms conflict with each other, behavioural intention towards a specific action is weakened (Smith et al., 2012). Interestingly, social pressure from peers towards purchasing sustainable products actually increase intentions to purchase them, even when the individual held negative personal attitudes towards these products (Vermeir & Verbeke, 2006).

Effective intervention functions for increasing social opportunity are similar to what has been suggested for improving physical opportunity – restriction, environmental restructuring and enablement (Michie et al., 2011). In addition to these, modelling might also be beneficial as a means of demonstrating the social norm of what is expected (Cialdini et al., 1991). In a detailed review on sources of environmental interest, concern and action, Chawla (1998) consolidated findings from surveys, interviews and questionnaires completed by conservationists, environmentalists, educators, and individuals who worked or volunteered in environment-related areas. She found that similar factors appeared consistently among the reviewed studies – one of which was having role models in the family who acted pro-environmentally (Chawla, 1998, 1999).

Automatic Motivation. Under motivation, the 'automatic' sub-division refers mainly to emotions and impulses that are triggered, as well as to innate dispositions (Michie et al., 2011). Several factors have been shown in meta-analyses to be relevant to automatic motivation (Bamberg & Möser, 2007; Hines et al., 1987), although it must be acknowledged that some factors may overlap both automatic and reflective motivation.

Emotions. A number of emotions have been studied in the context of PEB, and specifically with respect to green purchasing behaviour (Joshi & Rahman, 2015). In their meta-analytic research titled "Twenty years after Hines, Hungerford and Tomera", Bamberg and Möser (2007) described the role of feelings of guilt—an aversive feeling that motivates individuals to compensate for their past actions (Onwezen et al., 2013). In the context of ecological behaviour, guilt is an important predictor of feelings of moral responsibility towards the environment (Bray et al., 2011; Kaiser & Shimoda, 1999). A study examining recycling intentions in France found that anticipatory guilt was a key variable that served as a mediator between environmental concern and pro-environmental intentions (Elgaaied, 2012). Activating moral emotions using the interventional method of persuasion, particularly guilt (by presenting participants with texts on human-caused environmental damage), was found not only to lead to pro-environmental intentions, but also PEB (signing a petition related to pollution) among university students in Germany (Rees et al., 2014). In the context of sustainable consumption, emotions of guilt and pride have been found to influence pro-environmental purchasing behaviour by increasing self-efficacy (Antonetti & Maklan, 2014). Another emotion that has been studied in the context of behaviour change and self-efficacy is fear. A meta-analysis of fear appeal literature has concluded that strong fear appeals that are combined with high self-efficacy messages result in the greatest changes in behaviour; however, fear appeals presented with low a self-efficacy message result in the highest levels of defensiveness (Witte & Allen, 2000).

Empathy. Empathy refers to "an emotional response congruent with the perceived welfare of another" (Berenguer, 2007). Tam (2013) developed a scale to assess dispositional empathy with nature (DEN), which can be defined as a relatively stable trait that enables "the understanding and sharing of the emotional experience, particularly distress, of the natural world". Tested and validated on multiple Chinese samples and one sample from the United States, DEN was found to be significantly correlated with self-transcendent values, connectedness with nature, inclusiveness with nature, supporting an environmental movement and green behaviour frequency (Tam, 2013). Women were reported to have higher DEN and the study concluded that although empathizing with nature can motivate PEB, it is more likely to occur when self-efficacy is high. (Tam, 2013). Persuasion can be used to trigger empathy as well, and studies have demonstrated that empathy towards nature can be induced (with a perspective-taking task of an animal being harmed), which results in higher biospheric environmental concern, and could reflect how inclusive nature is with the self (Schultz, 2000). Another experiment manipulated empathy (high versus low) towards either a bird or a tree and found that individuals in the high empathy condition expressed more favourable attitudes towards nature as a whole and demonstrated more PEB (allocating funds for environmental protection), again lending weight to the role of empathy (Berenguer, 2007). With the use of virtual reality technology, it is even possible to help individuals feel as one with either an animal or a plant (Ahn et al., 2016), and thus increase their capacity for empathy and relatedness with nature.

Incentives or Rewards. Often pro-environmental behaviour may require increased financial investment (Lavelle et al., 2015). The principles of operant conditioning state that any behaviour that is positively reinforced will increase in frequency, and conversely, any behaviour that is followed by adverse consequences will decrease in frequency (Skinner, 1948). Financial incentives have been proven to help overcome some barriers to PEB,

specifically in facilitating environmentally important consumer behaviours (e.g., investments in home insulation, upgraded heating systems, etc.; Stern, 1999). At times, even non-financial incentives (particularly those that increase convenience), have also been found to be beneficial, and combining the two can increase the effectiveness of interventions (Stern, 1999). Individuals at different socio-economic levels demonstrate different PEB depending on their financial capacity (Lavelle et al., 2015) and therefore it has been suggested that different interventional strategies, even within financial incentivisation, may need to be adopted for targeting different socio-economic levels (Aini et al., 2013). Coercion is another suggested intervention, which is the principle behind imposing a carbon tax. Some reservations against using rewards or incentives include a reduction in intrinsic motivation (Stern, 1999), increasing an individual's self-enhancing value (de Groot & Steg, 2008), and a lack of stable behaviour change (Steg et al., 2014).

Reflective Motivation. Reflective motivation refers to a more conscious and evaluative decision-making that can be linked to several factors.

Values. Values are concepts or beliefs that serve as general guiding principles in an individual's life towards desirable end states (Schwartz, 1992). Several studies have highlighted the role of self-transcendent values (as opposed to self-enhancing values) in PEB, as reviewed by Steg and de Groot (2012). Specific to responsible environmental behaviour, de Groot and Steg (2008) have proposed three relevant value orientations: egoistic, altruistic and biospheric. Biospheric and altruistic values stem from self-transcendence values, and though the two are correlated, they have been found to be empirically different, while egoistic values stem from self-enhancing values (de Groot & Steg, 2008). It has been demonstrated that all of these value orientations can influence PEB, although the biospheric values (referring to an intrinsic value of the ecosystem) play a stronger role (de Groot & Steg, 2008).

However, in the face of financial costs, values are found to impact PEB when the actual costs of the behaviour are low, but values cease to influence PEB when costs are high (Phillips et al., 2018). Activating biospheric and altruistic value orientations through persuasion could increase the likelihood of engaging in PEB.

Personal norms. Personal norms refer to moral obligations generated in situations, that guide behaviour (Schwartz, 1977). Originally proposed to explain pro-social behaviour, the concept of personal norms and feelings of responsibility have been also used to understand PEB and have been supported by meta-analyses (Bamberg & Möser, 2007; Hines et al., 1987). Feelings of moral obligation are not easy to assess because personal norms are frequently constructed anew depending on the situation (Schwartz, 1977). Therefore, what is measured in a questionnaire can be expected to differ from the moral obligation experienced in the actual situation (Schwartz, 1977). Moral norms can be activated in an individual by inducing feelings of responsibility through persuasion, and hence can enhance PEB. Green purchasing behaviour has been specifically shown to be influenced by personal norms. Following a willingness to pay, personal norms was found to be an important predictor of green consumerism (Moser, 2015). However, another research study revealed that while personal norms are important, self-efficacy explained more variance in green purchasing intentions (Hanss et al., 2016).

Self-Efficacy. Self-efficacy refers to a belief that one can achieve success in areas of significance, and this sense of competence is essential for the healthy development of self-worth and persistence in reaching goals (Bandura, 1997). In the meta-analysis by Bamberg and Möser (2007), perceived behavioural control (PBC), which can be considered very similar to self-efficacy, was featured in the model they proposed. Ajzen (1991) distinguishes between PBC and locus of control, the former referring to a person's variable perception of

how easy or difficult performing a particular behaviour can be, while the latter is a stable, generalized expectancy. PBC is compatible with Bandura's construct of self-efficacy (Bandura, 1997). In the context of green consumerism, PBC is referred to as perceived consumer efficacy (PCE), which refers to the belief that one's purchasing decisions can have an impact on reducing environmental issues (Kinnear et al., 1974). PCE has been found to be an important mediator of green consumerism (Nguyen et al., 2019), and consumers high in PCE were more likely to use information on environmental and social issues to inform their choices (Ghvanidze et al., 2016). Further, self-efficacy has been identified as the mediator of pro-environmental spill-over, which refers to an increased likelihood of engaging in new and more difficult PEB after already having engaged in easier PEB (Lauren et al., 2016). In their study, engaging in easier PEB led to an increase in self-efficacy, which in turn led to expressing positive intentions towards engaging in more difficult PEB in future, as well as actual engagement in PEB nine months later (Lauren et al., 2016).

Just as individual self-efficacy is important, Chawla and Cushing (2007) discussed the importance of collective competence when dealing with environmental problems, as the sheer magnitude of issues can be daunting and young people can feel disempowered. A collective sense of competence is the belief held by a group of individuals, regarding their ability to co-ordinate actions effectively and the likelihood of their unified efforts leading to the accomplishment of shared goals (Bandura, 1997). Although collective efficacy is said to be a stronger predictor of PEB when compared to self-efficacy (Chen, 2015), it has been found that the mechanism through which collective efficacy exerts its influence is by increasing the self-efficacy of each member of the group, which in turn influences personal intentions to act pro-environmentally (Jugert et al., 2016). Messages imbibed with hopefulness and those highlighting an individual's capability can effectively persuade an individual towards environmental action (Witte & Allen, 2000).

Biophilia. Biophilia is understood as an emotional affiliation towards nature and all life (Wilson, 1993). Kellert (1993) elaborated on a classification of values related to biophilia – utilitarian (material and practical use of nature), naturalistic (satisfaction from direct experience with nature), ecological-scientific (systematic study of structure, function and relationship in nature), aesthetic (physical appeal and beauty of nature), symbolic (use of nature for metaphoric expression and language), humanistic (deep emotional attachment and affection for nature), moralistic (ethical responsibility, affinity and reverence for nature), dominionistic (desire for mastery and control over nature) and negativistic (fear, aversion and antipathy towards nature). Only one attempt has been made to measure biophilic attitudes through the development of a Biophilic Attitudes Inventory (Letourneau, 2013), which was part of a doctoral study, but the scale did not demonstrate sufficient construct validity. Out of all of the nine biophilic values, the humanistic and moralistic ones have been researched in the context of environmental altruism (Bamberg & Möser, 2007; de Groot et al., 2008; Mayer & Frantz, 2004; Perkins, 2010; Schwartz, 1977). Although concern and care for the environment may not directly predict PEB, research has proposed that it may indirectly influence green behaviour by influencing how much salience an individual attributes to specific knowledge and behavioural consequences (e.g., those high on environmental concern might seek out more information on green products; Bamberg, 2003).

Relating to Nature. The humanistic value of biophilia refers to attachment, connectedness and love for nature (Kellert, 1993). Studies have differentiated between an emotional connectedness and a cognitive connectedness to nature. In terms of measurement, the New Ecological Paradigm (NEP) (Dunlap et al., 2000), a revision of the 1978 New Environmental Paradigm, is a tool used frequently to assess beliefs and attitudes towards the environment. After it was criticized as only assessing an individual's cognitions towards nature, Mayer and Frantz (2004) developed the Connectedness to Nature Scale (CNS), which

they claimed tapped into emotional connectedness. However, this scale too fell under scrutiny, and it was discovered that contrary to the aims of the authors, the CNS appeared to be assessing cognitive beliefs as well; although the items were worded in terms of "I feel", the nature of the statements reflected cognitions (Perrin & Benassi, 2009). Following this, the Love and Care for Nature (LCN) scale was developed in order to focus on the emotional connectedness and care that one may feel towards nature (Perkins, 2010). All measures are related to increased PEB, with the LCN scale showing the highest correlations (Perkins, 2010).

Intention. In theories and meta-analytic models of pro-environmental behaviour, several factors lead to intention, which in turn lead to behaviour (Ajzen, 1991; Bamberg & Möser, 2007; Hines et al., 1987). However, it was found that the intention to act accounts for only 27 per cent of the variance of PEB (Bamberg & Möser, 2007), which indicates that there likely are variables other than intention alone that contribute to actual PEB. It is also important to keep in mind that just as specific intentions to engage in the behaviour in question better predict specific behaviour (Ajzen, 2005), intention to act needs to be assessed specifically in the context of a particular PEB.

These variables discussed can be summed up in the following table:

Table 2.3

Summary of literature according to the COM-B model

Sources of Behaviour		**Variables**
Capability	Physical	Physical skills; Financial capacity; Technology
	Psychological	Awareness; Knowledge
Opportunity	Physical	Environmental contexts and resources; Availability; Technological advancements
	Social	Culture; Social norms
Motivation	Automatic	Emotions; Empathy; Incentives or rewards

	Reflective	Values; Personal norms; Self-efficacy & perceived behavioural control; Biophilia; Relatedness to nature; Intention

Interventions. The goal of a majority of the research reviewed has been to increase the likelihood that one or more desirable behaviours will occur. Specifically, designing interventions in line with the BCW has become quite popular in the field of health (e.g., Carney et al., 2016; Fulton et al., 2016; Gould et al., 2017), although research with respect to PEB is lagging. One such study was a case study into recycling, where they found the BCW to be useful in understanding the different factors that led to better recycling behaviour (Gainforth et al., 2016). This study revealed that solely focussing on motivation alone is insufficient to overcome the barriers to behaviour change, but providing opportunities (for example, access to trash bins) and the necessary knowledge and awareness all together need to be present (Gainforth et al., 2016). Michie et al. (2011) emphasized that unique barriers across either capability, opportunity or motivation (or a combination) are implicated in specific behaviour, and therefore addressing the barrier is imperative in designing behaviour change interventions.

In a detailed review, Steg and Vlek (2009) summarized the effectiveness of different interventional strategies for encouraging PEB into informational strategies and structural strategies. Informational strategies are effective when the PEB is relatively convenient and there are few external barriers (Steg & Vlek, 2009). On the other hand, when PEB are difficult or costly, structural strategies targeting contextual factors—including infrastructure, legality, finance, availability, incentives and such—are necessary (Steg & Vlek, 2009). Although the BCW was not explicitly referred to in this review, it can be seen how informational strategies target psychological capability and motivation, while structural strategies address physical capability and opportunity. Another systematic review by Staddon

et al. (2016) looked at 22 interventions to save energy at the workplace, and used the BCW as a framework to discuss them under the nine categories of interventions proposed (Michie et al., 2011). They concluded that most of the research reviewed had an overlap of interventional categories, but they highlight enablement (reducing barriers to increase capability or opportunity), environmental restructuring (specifically with respect to technology) and modelling (as well as other social influences) to be successful strategies (Staddon et al., 2016).

PEB and Palm Oil

In the literature reviewed, there has been one Swedish ethnographic study conducted over 17 months that aimed to understand how the palm oil crisis (among other environmental issues) was understood and acted upon by consumers (Isenhour, 2014). It identified that although a large number of people held pro-environmental values, there were several barriers they faced, including the complexity of supply chains (which makes the palm oil in a specific supermarket product virtually untraceable), conflicting information on what might be best for the environment and rural communities in other countries, having an overwhelming number of options, ambiguous labelling and uncertainty about health impacts (Isenhour, 2014). In this paper, Isenhour (2014) emphasizes that while consumers can (and may be expected to) take responsibility for their own PEB, in the absence of government and policy support (for example, compulsory labelling of palm oil as such), consumer action is likely to be very difficult and ineffective.

With respect to interventions, only one study, which was conducted among Australian university students, was found. This study targeted sustainable behaviour in the context of palm oil, with the main focus being on orangutan conservation (Pearson et al., 2011). The researchers screened the documentary, ‘GREEN’ (Rouxel, 2009), and provided facts

regarding orangutans (their habitat, behaviour and intelligence) as well as how to help the conservation effort. Results indicated that short-term behavioural effects in terms of either making donations and/or responsible purchasing was observed in 84 per cent of the sample who returned the behavioural diary (only 36 per cent of the original sample returned the diary), which was attributed to increased knowledge and attitude change (Pearson et al., 2011). However, the study did not look into understanding the pathways by which the emotive documentary and the factual presentation (both were presented to all participants, but the order of presentation was counterbalanced) impacted behaviour. This mechanism is important to understand so that interventions can be specifically tailored accordingly. Further, long-term change was not very high (only 18 per cent of the original sample), and although the researchers recorded existing barriers to the desired behaviour change (Pearson et al., 2011), it is essential to understand what motivates and assists individuals to overcome these barriers, information it is hoped that the proposed study will provide.

Rationale for the Current Research

The palm oil crisis is an environmental and humanitarian situation that requires urgent attention, as current estimates state that Indonesia destroyed almost 25 per cent of its rainforests between 1990 and 2015 (World Bank, 2018), and there are no signs of this stopping. Orangutan numbers are greatly reduced, and a 16-year study (1999 to 2015) in Borneo, Indonesia, revealed that an estimated 150,000 orangutans had been lost during this period, reducing the entire population of Bornean orangutans to less than half of the original number when the study began (Sample, 2018). This species is predicted to be the first of the great apes to face extinction in a few decades (Wich et al., 2008). Yet judging by the dearth of specific literature, this crisis has not been given sufficient attention in environmental psychology.

Increasing engagement in PEB requires a systematic approach, and in his book, *Fostering Sustainable Behaviour: An Introduction to Community-Based Social Marketing (CBSM)*, McKenzie-Mohr (2011) outlines a five-step strategy to promote PEB. The steps include: (1) selecting the target behaviour by creating a behaviour prioritization matrix of impact, probability and penetration, to give an impact value for each non-divisible and end-state behaviour that one wishes to target; (2) identifying barriers to and benefits of these target behaviours; (3) developing interventional strategies; (4) conducting a pilot study; and (5) broad scale implementation and evaluation of the strategy (McKenzie-Mohr, 2011).

Before analysing relevant factors and barriers either specific to the individual or to the situation that may interact with each other in particular contexts (Stern, 1999), it is important to understand which particular behaviours would contribute to resolving this crisis. Consistent with step 1 of CBSM, studies 1 and 2 aim to select a target PEB that would be most impactful to address with respect to the palm oil crisis. Next, as each individual may be restricted or constrained in unique ways, it is important specifically to address the particular barriers to sustainable behaviour change (McKenzie-Mohr et al., 1995; Stern, 1999). Step 2 in CBSM proposes a generic model for exploring barriers and benefits of the selected target PEB. Study 3 corresponds to this step, but utilises the BCW, a comprehensive framework, to organise these barrier- and driver-factors in terms of capability, opportunity, and motivation (COM-B). Step 3 of CBSM involves developing intervention strategies, based on the understanding of identified barriers and drivers of the target PEB. Continuing with the BCW framework, a thorough understanding of which COM-B factors best differentiate between individuals who engage in the targeted PEB and those that do not, would provide sufficient information to design an intervention, corresponding to the second layer in the BCW (Michie et al., 2011), which study 4 aims to do.

Finally, it was decided that increasing palm oil-related PEB as part of this thesis research study would be first explored and tested out in a sample from an industrialized nation like Australia (step 4 in CBSM and study 5 in this thesis). Although palm oil consumption is the highest in developing countries like India and China (Schleifer & Sun, 2018), research has indicated that reducing oil consumption in comparable economies like the European Union (EU) and Unites States of America (USA) would go a long way in decreasing deforestation in tropical regions (Koh & Lee, 2012). Koh and Lee (2012) projected that according to their calculations, if every person in the EU and USA reduced their oil consumption equivalent to a large serving of French fries (25 grams) per day, tropical deforestation stemming from the pressure to produce more oil crops would decrease by approximately 50 per cent. It is hoped that if a specifically tailored novel intervention is found to be successful in an Australian sample, it can then also be implemented across other Western cultures, which could have a significant impact in addressing the ecological impacts of the palm oil crisis.

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CHAPTER THREE

Studies 1 & 2

Confronting the Palm Oil Crisis: Identifying Behaviours for Targeted Interventions

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Manuscript submitted to: Environmental Science & Policy

Status of Manuscript: Published

Submission Dates: Received 15 March 2019; Received in revised form 9 August 2019; Accepted 11 August 2019; Available online 06 November 2019

Citation:

Sundaraja, C. S., Hine, D. W., & Lykins, A. (2020). Confronting the palm oil crisis: Identifying behaviours for targeted interventions. *Environmental Science & Policy, 103*, 99-106. https://doi.org/10.1016/j.envsci.2019.08.004

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Abstract

Palm oil is an edible oil with a high yield, various economic benefits, and many diverse uses. However, its production has led to increased deforestation, the endangerment of several species, and toxic greenhouse gas emissions. The current study had two aims: (1) to generate a list of palm oil-related pro-environmental behaviours (PEB) that general community members in Australia can do; and (2) to identify one or more behaviours from this list to address in a behaviour-change intervention. Semi-structured interviews with 12 experts (environmental journalists, conservation scientists and activists) generated a list of 11 potential palm oil-related PEB. The same experts rated this list in terms of potential effectiveness in reducing the negative environmental effects of palm oil. A community sample of 300 participants rated the same PEB on likelihood of adoption and current penetration (i.e., the extent to which they already engage in the behaviour). These scores were integrated into a behaviour prioritization matrix, which revealed that the most beneficial PEB to target was "purchasing products containing only sustainable palm oil". This study is an essential preliminary step in behaviour change interventional research, and outlines the process of selecting specific consumer behaviour related to environmental concerns. Policy-based implications are discussed.

Keywords: palm oil, pro-environmental behaviour, behaviour prioritization matrix, behaviour selection, behaviour change intervention

Introduction

In an era of increased consumerism and global wealth, wide-spread urbanization and changing lifestyles have resulted in a growing demand for edible oil, often used in packaged and processed foods (Meijaard et al., 2018). Palm oil, derived from *elaeis guineensis*, has gained popularity due to its versatility, high yield, and relatively low production cost (Meijaard et al., 2018). Originally found in West Africa, the oil palm crop flourishes in tropical regions. Currently, Indonesia and Malaysia are the world's largest producers. In 2017-2018, Indonesia was estimated to produce 36.5 million metric tonnes of palm oil (Wright & Rahmanulloh, 2017), and this number is projected to reach 60 million tonnes annually by 2020 (World Growth, 2011).

The Palm Oil Industry and its Impacts

The rapid growth in the palm oil industry offered opportunities for livelihood in these producing developing countries and is a major source of income for rural communities (Lee, Ghazoul, Obidzinski, & Koh, 2013). Approximately 40 per cent of palm oil produced in Indonesia is obtained from smallholder farms, which are run as family farms (Meijaard et al., 2018). However, the expansion of oil palm plantations into tropical forests in Southeast Asia has been associated with environmental concerns and social conflicts (Koh & Wilcove, 2009; Meijaard & Sheil, 2013; Sheil et al., 2009).

Between 1990 and 2015, almost 25 per cent of Indonesia's rainforests were destroyed (World Bank, 2018), a large proportion of which is attributed to oil palm farming (Gilbert, 2012; Koh & Wilcove, 2008). This deforestation has negatively impacted the biodiversity in Southeast Asia (Koh & Wilcove, 2008), and has led to the critical endangerment of several native species, including the orangutan, Sumatran tiger, pygmy elephant, and sun bear (Meijaard & Sheil, 2013). The orangutan is predicted to be the first of the great apes to face

extinction, which may occur within only a few decades (Wich et al., 2008), as numbers have drastically declined. A 16-year study (1999 to 2015) in Borneo, Indonesia, revealed that an estimated 150,000 orangutans had been lost during this period, reducing the entire population of Bornean orangutans to less than half of the original number when the study began (Sample, 2018).

Figure 3.1. Forest cover in Borneo island (Indonesia, Malaysia and Brunei) in 1973 and in 2016 indicating the extent of deforestation. Reprinted from "What a difference 4 decades make: Deforestation in Borneo since 1973," by D. L. A. Gaveau, 2017 (http://www.cifor.org/publications/pdf_files/factsheet/6552-factsheet.pdf). Copyright [2017] by Center for International Forestry Research (CIFOR), Bogor, Indonesia. Used under Creative Commons Attribution License: https://creativecommons.org/licenses/by/4.0/

The popular slash-and-burn technique to clear forests, in addition to the draining of peatlands, is linked to increased greenhouse gas emissions (Sheil et al., 2009), specifically carbon-dioxide (Basyuni, Sulistyono, Slamet, & Wati, 2018; Carlson et al., 2012). This has resulted in Indonesia ranking as the third largest emitter of greenhouse gases in the world (Peace, 2007). The resultant Southeast Asian Haze (affecting not only Indonesia, but also

Malaysia, Singapore, and to a lesser degree the Philippines and Thailand) from the burning of peatlands has created health risks, particularly respiratory illnesses, among the locals (Islam, Hui Pei, & Mangharam, 2016; Varkkey, 2012). In 2015 alone, this haze was responsible for an estimated 100,300 premature deaths in these countries, and the pollution generated has been estimated to be greater than that emitted by the entire United States of America (Higonnet, Hurowitz, Bellantonio, & Lapidus, 2016).

The loss of forest cover directly and indirectly impacts the people who depend on these forests. In a large study involving approximately 5400 interviews with residents across over 700 villages on the island of Borneo, Meijaard et al. (2013) found that local communities rely on forests for food and medicine, as well as for cultural and spiritual purposes. Tropical rainforests also have direct environmental benefits such as reducing the surface temperature, assisting with water retention, and preventing floods (Meijaard et al., 2013; Wolosin & Harris, 2018). More recent research has revealed that the three main belts of tropical rainforests (Southeast Asia, Congo basin and the Amazon rainforests) play an important role in regulating water cycles, and in turn, global and local temperatures (Wolosin & Harris, 2018). Deforestation, particularly in tropical peatlands, in addition to the use of fire to clear land, have been implicated in climate change impacts (Wolosin & Harris, 2018).

Potential Solutions for the Palm Oil Crisis

Although oil palm agriculture poses immediate threats to the environment and biodiversity (Wilcove & Koh, 2010), the demand for palm oil continues to increase. Owing to its efficiency over other oilseed crops, its penetration into the global economy, and its high profitability, it is impractical to expect the production of oil palm to cease (Meijaard et al., 2018; Wilcove & Koh, 2010). Researchers have posited that encouraging sustainability (i.e., sourcing palm oil from plantations that have not replaced existing forests) at different levels

(e.g., smallholders, medium to large plantations, companies, retailers and consumers) constitute promising solutions to the crisis (Meijaard et al., 2018; Wilcove & Koh, 2010).

The call for sustainability led to the formation of the Roundtable for Sustainable Palm Oil (RSPO) in 2004, as a non-governmental organization whose stakeholders include producers, traders, consumers and investors in the palm oil industry (RSPO, 2018). While they have been promoting the use of certified sustainable palm, there are mixed reviews about their success. Although RSPO certification has indeed reduced deforestation, this was mainly seen in plantations that had little or no forests left within them prior to certification (Carlson et al., 2018). Further, there appeared to be no significant difference between RSPO certified and non-certified concessions (i.e., areas allocated by a government for industrial-scale oil palm plantations) on metrics of environmental, social and economic sustainability (Morgans et al., 2018). The RSPO has also been accused of "greenwashing" (Lang, 2015; Rahmawati, 2014), which refers to "the act of misleading consumers regarding the environmental practices of a company or the environmental benefits of a product or service" (Zudonya, 2011). Following this, the RSPO Complaints Panel commissioned a field review and promised to look into violations (Lang, 2015), although it remains to be seen if this has been effective at addressing the complaints. Recently, the RSPO underwent a revision of its Principles and Criteria, addressing concerns that were raised, and adopting stricter standards regarding deforestation and the use of fire (RSPO, 2018). If implemented and enforced, the revised standard appears to be a promising approach for reducing deforestation and improving sustainability (Lyons-White & Knight, 2018).

Changing consumer behaviour has the potential to make a significant impact on the environment (Stern, 1999). There is very little research pertaining to consumers assessing specifically how they might be able to have an impact on palm oil production or sales. It has been suggested that boycotting palm oil may be ineffective and produce deleterious flow-on

effects (Wilcove & Koh, 2010). Some have argued that consumers can create a demand for sustainable palm oil by placing pressure on manufacturers and retailers to use palm oil sourced without deforestation (Meijaard et al., 2018; Wilcove & Koh, 2010). These suggested strategies are by no means comprehensive. Further, there is no research available on which of these behaviours (or others) would be most impactful in addressing this ongoing environmental crisis.

In general, although individuals may be motivated to act pro-environmentally, they may lack specific knowledge about what they can do, and/or what would be effective and impactful behaviour (Gardner & Stern, 2008). To be able to influence the palm oil-related ecological crisis, it is important to understand the various pro-environmental behaviours (PEB) that the general public can employ that may have a desirable impact in reducing the abovementioned ecological threats. Lists on effective behaviours to reduce energy usage and water consumption are available (Gardner & Stern, 2008; Inskeep & Attari, 2014), as there are concrete means of measuring use and savings. However, with respect to concerns like that of the palm oil crisis, effective behaviour needs to be inferred based on the advice of experts in the field (McKenzie-Mohr, 2011).

Community-Based Social Marketing (CBSM)

In his book, *Fostering Sustainable Behaviour: An Introduction to Community-Based Social Marketing*, McKenzie-Mohr (2011) proposes a five-step framework to influence PEB. The first step includes selecting potential target behaviours based on their relative ability to reduce a specific environmental problem. This is done by creating a behaviour prioritization matrix (BPM) based on: 1) the extent to which the behaviour will solve the identified problem (effectiveness), 2) the likelihood that members of the target population will adopt the behaviour (probability); and 3) how regularly people already engage in that behaviour

(penetration). This formula (effectiveness *X* probability *X* inversed penetration (maximum possible penetration – observed penetration) = total weighted impact) allows researchers to rank each potential target behaviour in terms of its impact on the problem at hand (McKenzie-Mohr, 2011). McKenzie-Mohr (2011) argues that targeting behaviour solely on effectiveness alone may be unsuccessful. If the target audience indicates a low likelihood of engaging in a highly effective behaviour, behaviour change might be unlikely, requiring larger efforts with fewer results. It is also important to gauge the existing frequency with which people engage in the desirable behaviours. If there exists a relatively high level of penetration, there is little scope for further change (McKenzie-Mohr, 2011). Subsequent steps in the CBSM framework include identifying barriers and benefits to the target behaviour, and designing, evaluating and implementing an intervention accordingly (McKenzie-Mohr, 2011). The utilization of an impact-likelihood matrix has been demonstrated in a case study on water management behaviours, with particular relevance to policy decision making (Kneebone, Smith, & Fielding, 2017) and the BPM has been applied in prioritising behaviours with reference to wild dog management (Please, Hine, Skoien, Phillips, & Jamieson, 2017). The present study aimed to extend the use of the BPM to palm oil-related PEB.

Therefore, in line with step 1 of CBSM, the current study had two aims: the first was identifying a list of palm oil-related PEB that a large number of individuals can do, followed by identifying a target behaviour out of this list, based on effectiveness, probability, and penetration. The process undertaken to address these aims is described below in two parts.

Materials and Method

Preliminary Semi-Structured Interviews

A qualitative research design was adopted to identify potential PEBs that the general public would be able to perform in order to reduce the negative ecological impact of the expanding palm oil industry.

Participants

Twelve participants, whose experience in the field of interest ranged from 4 to 35 years, were interviewed. Three participants were environmental journalists, one of whom was involved with consumer-related research for the RSPO. One participant was formerly heading research in international forestry and is currently working as a strategy consultant in crop-related deforestation. Six participants were conservation scientists, working in orangutan conservation, landscapes, sustainable agriculture and policy-related decision-making, out of which one had moved on to become a chief sustainability officer at a large conglomerate that owns palm oil plantations. Two participants were activists who run not-for-profit organizations. One of them works towards the protection and conservation of the Leuser ecosystem (one of the world's most biodiversity-rich tropical rainforest in Indonesia), while the other works to promote consumer awareness and action. Participants have been involved with issues related to palm oil in Indonesia, Malaysia, Papua New Guinea, Columbia, England, and Australia. Four of these experts are native to palm oil-producing countries, while five others had spent between 2 to 30 years in these producer countries.

Procedure.

Experts were identified based on internet searches and media reports of and by individuals who are actively working with reference to the palm oil crisis. Emails were sent out explaining the research and requesting participation. Participants who consented were

interviewed via Skype, a video conferencing software, at a time of their choosing. The interviews were semi-structured and began with questions around the participant's area of expertise, background, years of experience and the nature of their involvement in the palm oil crisis. After these initial questions, participants were then asked about their expert opinion on what PEB the general public in Australia could engage in, that might be effective in reducing the ecological destruction caused by the palm oil industry. They were also finally asked for potential barriers that they anticipate the general public might face in trying to implement their suggestions. All interview questions were open-ended, in order to not influence participants' responses. The duration of interviews ranged from 25 to 60 minutes, and they all were audio-recorded for later transcription and analysis. Six interviews were done via video calls, while the other six were done with audio only, owing to inconsistent internet connectivity on the participants' end. All the interviews were transcribed verbatim, after which they were subjected to a basic thematic analysis (Braun & Clarke, 2006).

Ethics

The study was approved by the Human Research Ethics Committee of the University of New England (Approval No. HE18-184) and in compliance with the recommended research ethics procedure. All participants signed a written informed consent agreement prior to participation.

Expert and Community Surveys

A quantitative research design utilizing surveys was adopted in order to compute a BPM of palm oil-related PEB, utilizing potential effectiveness, the probability of adoption and existing penetration of the behaviours suggested by the experts in the preliminary semi-structured interviews.

Participants

Two sets of participants were recruited for the expert and community surveys. The "Experts" group consisted of the environmental experts that had been interviewed in Part 1 of this research. Out of the 12 original participants, 11 provided consent to be contacted for a follow-up survey. From this, 9 experts anonymously completed the survey. The "Community" group consisted of 300 participants (150 women, 149 men, 1 gender unspecified) from Australia, sourced using a survey panel from Qualtrics™, an online database, and survey administrator (Qualtrics, Provo, UT). Participants' ages ranged from 18 years to 87 years, with a median age of 45 years. Most participants (84%) indicated that they had completed Year 12 and/or tertiary or trade qualifications. Seven per cent of the participants were full-time students, 52% were working (employed full-time, part-time) and 22% reported being retired.

Measures

Two surveys were designed, one for each group of participants. For the "Experts", the survey required participants to rate the effectiveness of 11 palm oil-related PEB (obtained from the preliminary semi-structured interviews) in reducing the negative ecological effects associated with palm oil production, under the assumption that most Australians would adopt the behaviour. Their ratings were on an 11-point scale, where 0 = not at all effective and 10 = extremely effective. Participants were also requested to provide any further suggestions, if any, and rate these as well, and comment on whether any of the listed PEB would negatively affect smallholders.

For the "Community", participants rated the same list of palm oil-related PEB on penetration - how often the participant has engaged in the desired behaviour in the past 12 months (an indication of frequency of the behaviour on an 11-point scale, where 0 = never

and 10 = 10 or more times) and probability - how likely the participant is to engage in the behaviour during the next 12 months (on an 11-point scale, where 0 = not at all likely and 100 = extremely likely, with an interval of 10 points). Additional questions assessing the extent of awareness and concern about the environmental impacts of palm oil production in Southeast Asia were also included, requiring a rating on a 5-point scale (0 = not at all aware/concerned; 4 = extremely aware/concerned).

Procedure

Given that the "Experts" had already been informed of the survey when they had completed their initial interviews, an email with an anonymous survey link was sent out to them. After providing consent, they were requested to complete the short survey; a timeframe of one month was provided. No personal data were collected. "Community" participants were recruited through Qualtrics™ online panel (Qualtrics, Provo, UT). On providing consent, participants completed the survey. Qualtrics™ screened out participants who provided partial responses, or were below 18 years of age. A soft launch with 30 participants was initially done, after which the median time taken was calculated. Participants whose response times were below one-third of this median (less than or equal to 62 seconds) were automatically screened out as well.

Statistics

Basic descriptive statistics were calculated from the two data sets. From the survey administered to the "Experts", the average effectiveness rating for each item was computed. In the same manner, from the survey administered to the "Community", the average probability and penetration rating for each item was computed. These were incorporated into the formula Effectiveness *X* Probability *X* Inversed Penetration (Maximum Penetration – Observed Penetration), to produce a weighted impact score (McKenzie-Mohr, 2011).

Although not part of the initial aim, gender differences were examined (independent samples *t*-test). Additionally, correlations and multiple regression analyses were conducted on key items.

Ethics

The study was approved by the Human Research Ethics Committee of the University of New England (Approval No. HE18-283) and in compliance with the recommended research ethics procedure.

Results

The twelve expert interviews yielded several palm oil-related PEB that the general public in Australia can perform. Saturation of ideas was reached by the tenth interview and hence data collected ceased after two additional interviews. Table 3.1 summarizes all the suggestions of palm oil-related PEB and potential barriers, which were subsequently utilized in the expert and community surveys.

Table 3.1

Suggestions of palm oil-related PEB and potential barriers

Palm Oil-Related PEB	Potential Barriers
<u>As a Citizen</u>	
Educate oneself about the palm oil issue and its complexities, so as to have a non-biased perspective; share this knowledge with friends and family.	Complexity of the issue and its different facets Risk of vilifying palm oil Time-consuming
Write/Talk to politicians and local governing representatives about the country's sourcing of sustainable palm oil, for example, to encourage the national government to put a procurement policy in place, or utilize the country's foreign aid policy in a way to put	Time-consuming Lack of easy accessibility For a lay person, follow-up may be difficult

pressure on local governments to enforce sustainability and traceability in their respective countries.	
Write/Talk to politicians and local governing representatives about informative labelling on all products that can be purchased at a grocery store or supermarket, specifically labelling sustainable and unsustainable palm oil.	Time-consuming Lack of easy accessibility For a lay person, follow-up may be difficult
<u>As an Activist</u>	
Join an NGO/activist/advocacy group that is working in the field of sustainable palm oil, or reducing the adverse impacts of the expanding palm oil industry.	Time-consuming Requires a higher level of commitment and capacity to get involved
Become involved with the RSPO – assisting in making their standards stringent, and working towards achieving them.	Time-consuming Requires a higher level of commitment and capacity to get involved May not be possible at an individual-level – would need to be done as part of an organization
Write petitions to manufacturers, requesting them to switch towards sustainable sources of palm oil.	Time-consuming Politics and landscapes make traceability difficult
<u>As a Consumer</u>	
Avoid products from companies that do not explicitly state that their palm oil is sustainable – as much as possible, purchase products using sustainable palm oil.	Time-consuming to read the labels Labels do not always provide sufficiently accurate information Insufficient options of products containing sustainable palm oil Products containing sustainable palm oil tend to be more expensive

	Lack of trust regarding the sustainable logo/label
Avoid or reduce consumption of manufactured food products that contain palm oil (e.g. some types of chocolates, biscuits, crisps, etc.)	Lack of motivation
Speak/Write to local retailers, expressing concerns about unsustainability – request them to ensure that products on their shelves legitimately source only sustainable palm oil.	Time-consuming For a lay person, follow-up may be difficult Insufficient options of products containing sustainable palm oil Products containing sustainable palm oil tend to be more expensive
<u>As an Investor and/or Philanthropist</u>	
Make donations to NGOs/organizations working in this field.	Must have the financial capacity to do so
Check whether your bank is financing / supporting companies that continue to have unsustainable practices with respect to oil palm – put pressure on them to be more discerning with their investments.	Time-consuming Must have the financial capacity to do so
Ensure that personal investments do not support companies and manufacturers that source unsustainable palm oil.	Time-consuming to do the research Information may not be easily available (lack of transparency) Must have the financial capacity to do so

Participants also shared their experiences and perspectives on the palm oil crisis. All of them emphasized that environmental problems, such as this one, are fraught with complexities and rarely is there a single optimal solution available. A key message that

repeatedly emerged was the danger of vilifying palm oil, emerging from an incomplete understanding of the complex variables involved in this crisis. Campaigns in Western countries have focussed on the plight of orangutans, using an emotion-triggering narrative to motivate avoiding products with palm oil. However, governments in Indonesia and Malaysia view oil palm expansion as economically beneficial and perceive efforts that discourage palm oil use with suspicion. There is a growing belief by these producer countries that they are being unfairly persecuted by developed countries who may have ulterior motives in promoting other vegetable oils. While highlighting only the orangutan is an oversimplification, there was concern that excessive information might serve to confuse people, which may lead to inaction.

Given its presence in more than half the products we find on supermarket shelves, the dependence of local farmers on this crop in Southeast Asia, and oil palm's high yield (as compared to all other oilseed crops), all participants believed that working towards sustainability holds the solution for the crisis. Some participants noted that those who strongly criticize the certification path to sustainability have failed to offer viable alternate solutions or suggestions. Another participant reported that pressure to ban palm oil would only serve to alienate and discourage those who are working towards sustainability. Therefore the entire list of potential palm oil-related PEB (except one – avoid or reduce consumption of manufactured food products that contain palm oil) is based on the goal of working towards palm oil sustainability.

All participants mentioned the RSPO and the consensus (except for one participant) was that it was better than nothing, although respondents acknowledged several barriers and the lack of current visible results. In interviews, the RSPO has been referred to as "sub-optimal" and "far from being a perfect process". Participants believed that improvement was essential for the RSPO but cautioned against the dichotomous perspective that the RSPO was

"terrible and completely untrustworthy" or that it is "excellent". Some experts suggested that supporting the RSPO would strengthen it and assist advancement, highlighting that compared to other industries (e.g., soybean, beef), palm oil seems to be making the most progress. One expert, whose research highlighted the RSPO's limited effectiveness, emphasised that there have been "positive constructive discussions" between her research team and the RSPO, "because we all want the same thing". In her experience, the RSPO has been receptive to constructive feedback, utilizing it to further strengthen its principles and criteria. Another participant was one of the founding architects of the RSPO, although he also acknowledged that he has been a vocal critic of the same. He reported that only about 20% of oil palm companies were members of the RSPO, and it is possible that the remaining 80% are perhaps responsible for most of the ill-effects on the environment. However, one participant in particular had a strong opinion that RSPO facilitated "greenwashing." She believed that it was a broken system, upon which new policies were trying to be built. All participants believed that certification alone likely did not hold the complete answer. The advent of better monitoring technology (like Global Forest Watch) is hoped to assist improved transparency and monitoring regarding the supply chains in the industry, which may enhance trust in sustainability certification schemes.

Given the list of suggestions and complexities expressed, the survey data were utilized to identify which palm oil-related PEB would be most beneficial to target. This was based on the behaviour's effectiveness in reducing negative ecological effects, having the highest probability of being adopted, and having an existing low penetration in the general public. Table 3.2 provides information on all these values, including the weighted impact score obtained by multiplying effectiveness, probability and inversed penetration.

Table 3.2

Behaviour Prioritization Matrix (BPM)

Palm Oil-Related PEB	Expert Online Survey	Community Online Survey		
	Effectiveness (0-10)	Probability (0-10)	Inversed Penetration (0-10)	Total Weighted Impact
Purchasing only products that contain sustainable palm oil.	7.56	3.74	7.60	214.89
Divest or not invest in companies that produce or make use of unsustainable palm oil.	7.22	2.37	8.87	151.78
Discussing the negative environmental impacts of unsustainable palm oil production with family and friends.	6.22	3.24	7.40	149.13
Seeking information (internet, NGO campaign materials) regarding the negative environmental impact of the palm oil industry.	5.11	3.07	7.60	119.23
Writing to manufacturers to request that they use only sustainably produced palm oil in their products.	7.89	1.64	9.08	117.49
Donating money to a local or international organization (e.g., Greenpeace or the World Wildlife Fund) seeking to reduce or eliminate unsustainable palm oil production	5.78	2.25	8.63	112.23
Contacting a local representative to request that Australia introduce tighter restrictions on the import	6.89	1.83	8.85	111.59

of unsustainably produced palm oil products.				
Contacting a local representative to request compulsory labelling to enable consumers to easily distinguish between products containing sustainably and unsustainably produced palm oil.	6.56	1.84	8.80	106.22
Requesting local retailers and/or supermarkets to not stock products containing unsustainably produced palm oil	5.67	1.76	9.13	91.11
Avoiding food products containing palm oil (e.g., certain types of biscuits, chocolates, crisps, etc.).	2.89	4.05	6.85	80.18
Volunteering with a local or international environmental organization (e.g., Greenpeace or the World Wildlife Fund) that work on issues related to unsustainable palm oil production.	5.22	1.65	9.14	78.72

Based on the BPM, the behaviour most beneficial to target was purchasing products that contain only sustainable palm oil, thereby encouraging the market for sustainable palm oil. The behaviour with the second highest total weighted impact was divesting or not investing in companies that produce or make use of unsustainable palm oil. While experts rated writing to manufacturers to request that they use only sustainably produced palm oil in their products as having a high effectiveness, this had the least probability of being adopted. Avoiding food products containing palm oil (e.g., certain types of biscuits, chocolates, crisps, etc.) had the highest likelihood of being adopted, but the least perceived effectiveness in reducing ecological harm and the least inversed penetration (i.e., relatively more community

participants reported that they already engage in this behaviour, so observed penetration was already high).

Awareness and concern about the environmental impacts of unsustainable palm oil production in Southeast Asia were positively correlated to all the probability and penetration items (ranging from $r = .204$ to $r = .672$, $p < .001$). Two multiple linear regression analyses were conducted to predict the existing penetration and the likelihood of purchasing products containing only sustainable palm oil, based on awareness and concern. Together, awareness and concern explained 33% of the variance ($R = .576$, $R^2 = .332$, adjusted $R^2 = .327$) in current sustainable palm oil purchasing behaviour (penetration), and 46% of the variance ($R = .679$, $R^2 = .461$, adjusted $R^2 = .458$) in respondents' projections that they would engage in sustainable palm oil purchasing behaviour in the future (probability). Further, awareness emerged as a stronger predictor, accounting for 10% of the unique variance in penetration, and 17% of the unique variance in probability. A summary of both regression analyses is presented in Table 3.3.

Table 3.3

Predicting the penetration and probability of purchasing products containing only sustainable palm oil from awareness and concern

Dependent Variable	Predictors	B	95% CI for B		β	r	sr^2
			LB	UB			
Penetration	Awareness	1.076**	.763	1.390	.447	.563**	.10
	Concern	.389*	.086	.691	.167	.479**	.01
Probability	Awareness	1.536**	1.223	1.848	.574	.540**	.17
	Concern	.389*	.065	.713	.140	.697**	.01

* p = .01 , ** p <.001

Age showed small but significant negative correlations with most probability and penetration items ($r = -.119$ to $r = -.278$, $p < .05$). The younger the age, the more likely individuals were to indicate higher penetration and likelihood. However, with respect to the

probability of avoiding foods containing palm oil, the correlation with age was not significant (r = -.039, p = .497). There were no significant gender differences observed on the probability and penetration items. However, women reported being significantly more concerned about the environmental impacts of palm oil production in Southeast Asia; $t(297)$ = -2.28; p = .023.

Discussion

The present research aimed to generate a list of palm oil-related PEB that the general community in Australia can engage in, followed by identifying a target behaviour out of this list based on effectiveness, probability, and penetration. Eleven potential palm oil-related PEB were identified, out of which "purchasing products containing only sustainable palm oil" received the highest weighted impact score.

The interviews with experts highlighted the complexities inherent in the palm oil crisis, and confirmed that banning palm oil products was not an optimal or desirable solution (Lyons-White & Knight, 2018; Wilcove & Koh, 2010). These echo findings in the International Union for Conservation of Nature's (IUNC) report on 'Oil Palm and Biodiversity' (Meijaard et al., 2018). Encouraging sustainability was recommended by almost all experts, which is consistent with earlier findings (Meijaard et al., 2018; Wilcove & Koh, 2010). Although there are mixed opinions about the RSPO as a standard of sustainability certification, other certification standards in palm oil such as the Indonesian Sustainable Palm Oil (ISPO) and the Malaysian Sustainable Palm Oil (MSPO) have been deemed to be less credible in terms of environmental protection (Hidayat, Offermans, & Glasbergen, 2018; Schouten & Bitzer, 2015). At present, hard evidence supporting the RSPO's effectiveness is lacking (Carlson et al., 2018; Morgans et al., 2018), but the RSPO has indicated that it is open to receiving constructive feedback to improve certification validity (Schouten & Glasbergen,

2011, 2012). It is hoped that the enforcement of their revised Principles and Criteria (RSPO, 2018) will encourage the industry to evolve more sustainably into the future (Lyons-White & Knight, 2018).

Previous research has highlighted the roles of growers, producers, manufacturers and retailers and how they can work towards improving sustainability (Wilcove & Koh, 2010). However, the current study focussed on how *members of the community* can engage and contribute towards this issue. Using the BPM (McKenzie-Mohr, 2011), the palm oil-related PEB with the highest total weighted impact score was purchasing products that contain only sustainable palm oil, which is a consumer behaviour. The global demand for certified sustainable palm oil is reported to be less than the supply, which is problematic, but can be improved when consumers drive the demand for sustainable palm oil (Lyons-White & Knight, 2018; Schouten & Glasbergen, 2012). It is likely that much of this purchasing behaviour would concern food products, as 80 to 90 per cent of palm oil produced is used for human food consumption (Shimizu & Desrochers, 2012).

The suggestion of placing pressure on manufacturers and retailers to use only sustainably sourced palm oil (Wilcove & Koh, 2010) had a high potential effectiveness. However, this PEB was judged as least likely to be adopted by the community participants, and therefore would not be the first behaviour to target (McKenzie-Mohr, 2011). Further, one expert mentioned that people in the general community may not have the capacity to follow-up after complaints are made, to ensure that companies adhere to commitments. Therefore, this behaviour can be classified as 'hard but effective' (high effectiveness but low probability; Kneebone et al., 2017) and can be addressed at a later stage. It has been suggested that promoting 'catalytic' or 'wedge' PEBs that are simple and relatively easy (e.g., environmentally-friendly purchasing behaviour) can precede more effective and potentially difficult steps (Thøgersen & Noblet, 2012). Targeting PEB in this manner—taking

into consideration effectiveness, probability and penetration—increases confidence that interventions will have the desired outcome (McKenzie-Mohr, 2011).

Awareness about the negative environmental impacts of the unsustainable palm oil industry in Southeast Asia explained a relatively large amount of unique variance in the probability and penetration of the target behaviour. Knowledge about an environmental issue, possible actions and their consequences, has been identified as a significant factor in a seminal meta-analytic study on PEB (Hungerford & Volk, 1990). Concern about environmental issues has also been highlighted in several studies (Elgaaied, 2012; Schultz, 2000), although it is not always a good predictor of environmental responsibility or purchase choices (Mainieri, Barnett, Valdero, Unipan, & Oskamp, 1997; Young, Hwang, McDonald, & Oates, 2010), which was also reflected in the current study.

Implications

These findings have several policy-level implications, as the experts have identified potential barriers that might be beyond an individual's control which could prevent him or her from purchasing products that contain only sustainable palm oil. The most apparent barrier is insufficient information on labels, which can prevent consumers from making informed choices. In Australia, palm oil need not be specifically labelled and can be subsumed under the generic term 'vegetable oil' (FSANZ, 2017). An application to label palm oil owing to its negative ecological effects was rejected on the grounds that palm oil did not impact the adequacy of supply, quality or the safety of food, and that international environmental issues were beyond the scope of the Food Standards Australia New Zealand's objectives (FSANZ, 2008). Visible labels describing whether palm oil is present or absent, and further whether it has been sourced sustainably, can assist consumers to make more informed purchases. Further, there are not many options for products that contain sustainable

palm oil. One of the experts suggested that the Australian government could consider putting procurement policy in place. In 2012, the United Kingdom government put forth a statement on sustainable palm oil, where they committed to achieving 100 per cent sourcing of credibly certified sustainable palm by 2015 (Defra, 2017). While this has not been fully achieved yet, considerable progress has been made, thus increasing the country's sourcing of sustainable palm oil (Defra, 2017). Finally, as the definition of 'sustainable palm oil' is open to much debate (Defra, 2017; Wilcove & Koh, 2010), working towards a comprehensive, widely accepted definition would enhance work in the area of sustainability.

Limitations

Ratings on the potential effectiveness of specific behaviour on reducing the negative ecological effects of the unsustainable palm oil industry were obtained solely from expert ratings. While objective information on current carbon emissions, tree cover loss and forest fire occurrences related to the palm oil (Carlson et al., 2012; Carlson et al., 2018) can be obtained, there are no concrete data available on how the identified PEBs might influence rates of deforestation or greenhouse gas emissions. In the absence of this information, reliance on expert ratings is the recommended approach (McKenzie-Mohr, 2011). Further, efforts were taken to minimize potential biases in responses by recruiting experts from diverse backgrounds, including journalists, scientists, activists, and those involved directly with the palm oil industry**.**

Second, the ratings of probability of adoption and penetration obtained from the community surveys may be subject to social desirability effects, providing inflated estimates relative to actual behaviour (McKenzie-Mohr, 2011). Nevertheless, given these ratings were used to compare the likelihood of adoption and frequency of engagement across all suggested

PEBs, any systematic inflation effects should not impact the relative ranks of the Total Weighted Impact scores.

Conclusions

In conclusion, effectively addressing the palm oil crisis requires a nuanced understanding of the complex trade-offs involving economic, social and environmental needs. If a majority of consumers restricted their purchases to products containing only sustainable palm oil, this would incentivise plantations and producer countries to adopt sustainable practices. Future research should examine the barriers and drivers of consumer purchasing behaviour of sustainable palm oil products, and investigate behaviour change interventions aimed at increasing the adoption of such practices. Further, utilizing the BPM to select target PEB can ensure that resources are allocated more effectively, by targeting those behaviours that are most likely to have the desired impact on specific environmental concerns.

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Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF ORIGINALITY

(To appear at the end of each thesis chapter submitted as an article/paper)

We, the Research Master/PhD candidate and the candidate's Principal Supervisor, certifythat the following text, figures and diagrams are the candidate's original work.

Type of work	Page number/s
Text (inclusive of tables)	54-82

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05/04/2021

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19/04/2021

Principal Supervisor Date

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF AUTHORS' CONTRIBUTION

(To appear at the end of each thesis chapter submitted as an article/paper)

We, the Research Master/PhD candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated in the *Statement of Originality*.

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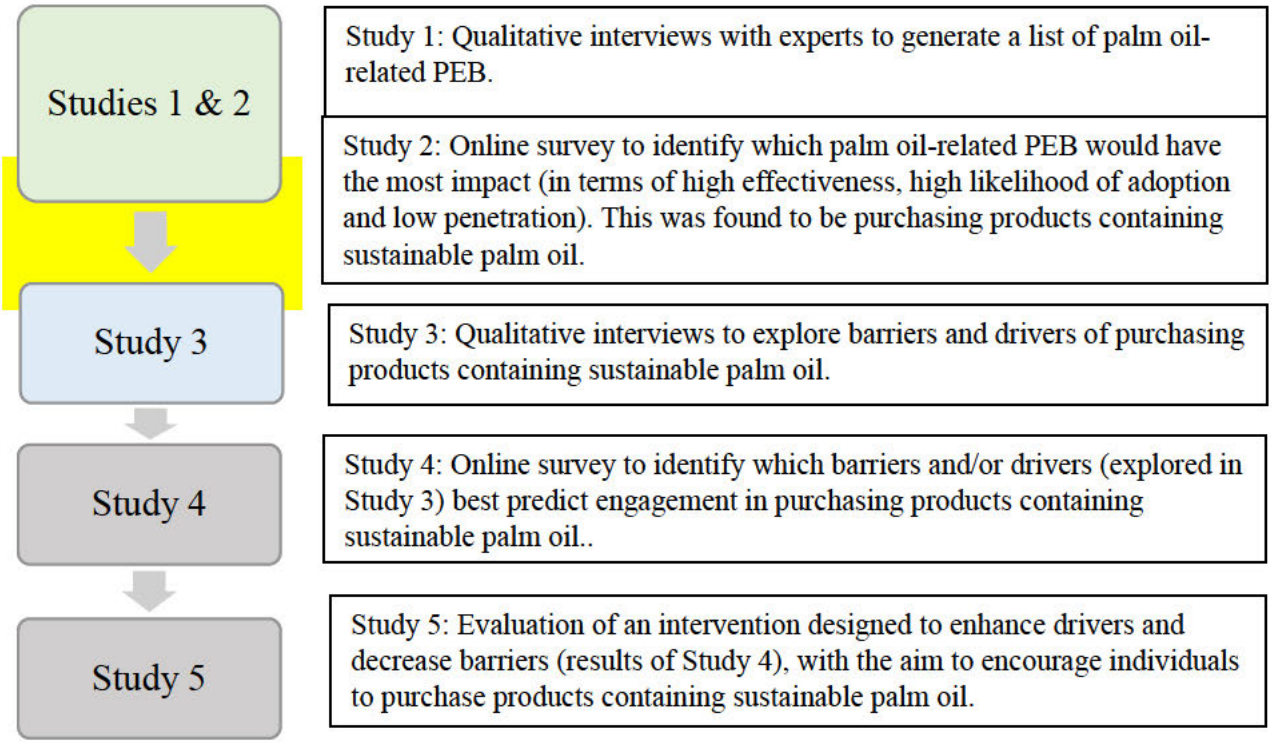
Research Progression to Study 3



In accordance with step 1 of CBSM, Study 1 generated a list of eleven potential palm-oil related pro-environmental behaviours that Australian community members can engage in as citizens, consumers, activists, and/or investors/philanthropists. This list was used in Study 2 to form a behaviour prioritization matrix, that ranked each behaviour on a weighted impact score – a product of its perceived effectiveness in reducing ecological destruction, probability of adoption among community members and inversed penetration (1 minus the frequency with which the behaviour is already being performed). Based on this, purchasing products containing sustainable palm oil was selected as the target behaviour. Therefore, in line with step 2 of CBSM, Study 3 aimed to explore the various barriers and drivers that Australian consumers might face when they attempt to purchase products containing sustainable palm oil. Understanding barriers and drivers to the target behaviour is essential in order to design an appropriate intervention that can specifically address the identified barriers to increase the desired behaviour.

CHAPTER FOUR

Study 3

Can Consumers Do It All? An Exploration of Factors that Influence the Purchase of Sustainable Palm Oil Products

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Manuscript submitted to: Journal of Food Products Marketing

Status of Manuscript: Published

Submission Dates: Received 22 April 2021; Received in revised form 30 July 2021; Published online 12 August 2021

Citation:

Sundaraja, C. S., Hine, D. W., Alex, A., Cosh, S. M., & Lykins, A. (2021). Can consumers do it all? An exploration of factors that influence the purchase of sustainable palm oil products. *Journal of Food Products Marketing.* https://doi.org/10.1080/10454446.2021.1965063

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Abstract

Green consumption refers to consumer decision-making that prioritises the environmental impacts of purchases. The aim of the current research was to identify factors that influence consumers to purchase sustainable palm oil (SPO) products. Semi-structured interviews were conducted with 13 adult residents of Australia, transcribed, and subjected to framework analysis, with sub-themes classified under main themes of capability, opportunity, and motivation. While several sub-themes emerged, those barriers unique to SPO purchasing behaviour included a lack of knowledge combined with contradictory information on the best course of action, palm oil being a hidden ingredient that is often not labelled such, and reduced availability and/or visibility of SPO containing products. These barriers are difficult for consumers to overcome on their own. Policy and structural modifications to procurement and labelling, as well as widespread awareness campaigns with a uniform message, could assist in providing a platform for consumer reform.

Keywords: sustainable palm oil, green purchasing, consumer behaviour, behaviour change wheel, COM-B

Introduction

In September 2019, the news was filled with discussions about climate. While the Amazonian rainforests in Brazil continued to burn (Slezak & Doman, 2019), tropical forests and peatlands in Indonesia had been set aflame, literally turning the sky red ("Indonesia haze causes sky to turn blood red," 2019; Wright et al., 2019). Both rainforests were being cleared for agricultural purposes.

There is increasing attention towards the role of food and agriculture in increased greenhouse gas emissions that contribute to climate change (Fuchs, 2013; Rohila et al., 2017), with a specific focus on consumers in industrialised and developed countries (Koh & Lee, 2012). The idea of responsible consumption for ecological reasons was initially postulated by Fisk (1973), where he stressed that the then current rates of "irresponsible consumption" would lead towards an inevitable "population crash." He advocated for reduced mass consumption (primarily in developed countries), in the hope of achieving a symbiotic relationship between humans and the environment. This idea has since been propagated, with terms like "green consumerism," "sustainable consumption," and "ethical consumer" being used in literature.

Green consumption, as defined by the Cambridge Business English Dictionary ("Green consumerism," 2019), is the purchasing and consumption of products that have been produced in a manner that protects the natural environment. Although sometimes used interchangeably (Hanss et al., 2016), sustainable consumption can be subsumed under green consumerism (Ponting, 2011). Sustainable consumption is "the use of goods and services that respond to basic needs and bring a better quality of life, while minimising the use of natural resources, toxic materials and emissions of waste and pollutants over the lifecycle, so as not to jeopardise the needs of future generations" (Oslo Symposium, 1994). The understanding around sustainability is complex and multi-faceted (Giulio et al., 2014; Welch & Southerton,

2019). One of the ways of promoting sustainable consumption is by addressing consumer decision-making, although this cannot be looked at in isolation, and needs to consider the context of manufacturing and societal influences on the behaviour in question (Fuchs, 2013; Welch & Southerton, 2019).

Palm oil is a commodity oil that has sparked controversy across the world. Heralded by some as a wonder crop with a very high yield, relative inexpensiveness and significant versatility, palm oil is considered the major path to economic growth for countries like Indonesia and Malaysia (Meijaard et al., 2018). The booming global market for palm oil has led to large-scale clearing of tropical rainforests, consequently negatively impacting biodiversity in Southeast Asia (Gaveau, 2017; Gilbert, 2012; Koh & Wilcove, 2008; Meijaard et al., 2018; Meijaard & Sheil, 2013; Wright et al., 2019). This has pushed several species, including the orangutan, towards critical endangerment (Meijaard & Sheil, 2013; Sample, 2018; Wich et al., 2008). The popular slash-and-burn technique to clear forests drains the peatlands upon which these rainforests grow, thereby releasing copious amounts of greenhouse gases like carbon dioxide (Basyuni et al., 2018; Carlson et al., 2012; Sheil et al., 2009). Not only does this threaten the world's climate balance (Wolosin & Harris, 2018), but it has also led to acute respiratory illnesses (and death) in hundreds of thousands of people across Southeast Asia (Islam et al., 2016; Varkkey, 2012; Wright et al., 2019).

Amid calls to ban the use of palm oil for the abovementioned reasons (D'Antone & Spencer, 2015), there is concern for the livelihoods of rural farmers who depend on the oil palm crop (Lee et al., 2013). Over 40 per cent of oil palm plantations are run as family farms (also known as smallholders; Meijaard et al., 2018). Therefore, experts in the field and researchers have recommended the promotion of sustainable palm oil (SPO), grown without clearing existing rainforests (Meijaard et al., 2018; Parsons et al., 2020; Sundaraja et al., 2020; Wilcove & Koh, 2010). The Roundtable on Sustainable Palm Oil (RSPO) was set-up in

2004 as a non-governmental body to regulate and certify palm oil that meets its sustainability standards, in an effort to promote SPO growth (RSPO, 2018).

There have been mixed reviews about the efficacy of the RSPO in enforcing its regulations (Carlson et al., 2018; Morgans et al., 2018) and frequent accusations of "greenwashing" (Environmental Investigation Agency & Grassroots, 2019; Lang, 2015; Rahmawati, 2014), which refers to "misleading consumers regarding the environmental practices of a company or the environmental benefits of a product" (Zudonya, 2011). It is no surprise then that the use of the term sustainability in the palm oil industry is viewed with suspicion and wrought with complexity. The RSPO has been known to welcome constructive feedback (Schouten & Glasbergen, 2011, 2012; Sundaraja et al., 2020), and activists and researchers working in the field continue to believe that creating a demand for SPO would encourage plantations to adopt more sustainable practices (Lyons-White & Knight, 2018; Schouten & Glasbergen, 2012; Sundaraja et al., 2020). Increasing the demand for SPO, therefore, may require consumer action as one of the first steps.

In this light, it becomes clear that we need to understand the factors that either drive or inhibit consumers from purchasing products with SPO, to develop a market for it. There is a large body of research that has looked at barriers and drivers of green, sustainable, and ethical consumption (e.g. Bray et al., 2011; Carrington et al., 2010; Gleim et al., 2013; Mainieri et al., 1997; Moser, 2015; Vermeir & Verbeke, 2006; Young et al., 2010). Joshi and Rahman (2015) conducted a systematic review of 53 empirical articles published between 2000 and 2014 on green purchasing behaviour and/or intention. In this review, green purchase behaviour was used as an umbrella term referring to a variety of consumer behaviours, from habitual ones like purchasing organic or plastic-free products, to one-time investments, like buying an energy-efficient washing machine (Joshi & Rahman, 2015). The individual factors that they identified included emotions (environmental concern and

consumer guilt), habits, perceived consumer efficacy (PCE; belief that one's consumer power can make a difference), perceived behavioural control (PBC; perceived control over one's behaviour or actions), values and personal norms (particularly altruism, universalism, and benevolence), trust in green products, and knowledge about environmental issues (Joshi & Rahman, 2015). Another set of factors was termed as situational, and referred to price, product availability, social norms, product attributes and/or quality, store-related attributes, brand image (in terms of preferred and familiar brands), as well as eco-labelling and certifications (Joshi & Rahman, 2015).

Individual quantitative studies in this area have tended to focus on a relatively narrow range of sustainable consumption predictors. For instance, using structural equation modelling, one German study identified willingness to pay as an important predictor of green purchasing behaviour, followed by personal norms (Moser, 2015). Another Norwegian study indicated that self-efficacy explained more variance in green purchasing intentions than personal norms, attitudes, or demographic details (Hanss et al., 2016). It is worth noting that such studies investigating green behaviour in general may overlook unique barriers to a specific green consumer behaviour (e.g., consumption of SPO). At the same time, other studies focusing on only a few consumer-related variables risk ignoring other factors (apart from consumer motivation) that could influence the studied behaviour. Further, as pro-environmental consumer decision-making is very complicated, established survey-based methods may be inadequate to developing a good understanding of this complexity (Carrington et al., 2014).

Some qualitative studies in this field have taken a more exploratory approach. An immersive research study with 13 Australian participants over nine months looked at ethical consumerism across a wide variety of issues, including waste, packaging minimization, veganism, recycling, sustainability, fair trade, and animal welfare (Carrington et al., 2014).

Interpretive grounded analysis revealed that those who were more likely to engage in ethical consumerism formed specific plans in order to break old habits, were willing to commit and make sacrifices, and shopped in a premeditated, quick manner (Carrington et al., 2014). In another introspective qualitative study, 51 Italian consumers who reported having pro-environmental attitudes, but did not follow through with their behaviour, were interviewed (Barbarossa & Pastore, 2015). The research examined one specific behaviour – purchasing eco-friendly tissue paper products. Using a cognitive mapping technique, the data revealed that higher product price and limited availability of green products were the main barriers (Barbarossa & Pastore, 2015). In comparison to several studies discussed above, this research highlights the role of factors external to the consumer that could be major obstacles to the desired pro-environmental behaviour.

While the factors discussed above would probably help explain some barriers and drivers to the purchasing of SPO, there are several unique aspects of the palm oil issue that require further exploration. Compared to many other green purchasing decisions, palm oil is ubiquitous and found in a wide range of supermarket products; the "right" consumer decision is not always clear, (i.e., should the consumer boycott palm oil or purchase SPO) (Dauvergne 2018); and there is little available information on palm oil and potential environmentally friendly alternatives (Hinkes and Christoph-Schulz, 2019; Isenhour, 2014). Researchers in Germany conducted a qualitative study utilising online and face-to-face focus group discussions exploring consumer attitudes towards palm oil (Hinkes & Christoph-Schulz, 2019). This research highlighted the lack of sufficient information on palm oil and potential alternatives, and revealed that participants held negative attitudes about palm oil in general, which could serve as a potential barrier to purchasing SPO (Hinkes & Christoph-Schulz, 2019). A Swedish ethnographic study conducted over 17 months (including shadowed shopping trips) noted that the palm oil issue is incredibly complex with seemingly competing

environmental and social concerns, and that there is limited available information on the supply chains. Consumers are faced with an overwhelming number of choices combined with limited time to research each environmental issue (Isenhour, 2014). In a broader sense, this study highlighted cost, ease of availability, and the need for convenience as influencing green consumerism (Isenhour, 2010), but did not specifically focus on barriers to purchasing SPO.

Studies highlighting situational obstacles to green consumerism suggest that an ongoing commitment to sustainable purchasing may be too heavy a responsibility for individuals to bear (Giulio et al., 2014; Isenhour, 2014; Lange & Coremans, 2020; Moisander, 2007; Welch & Southerton, 2019). Interventions that target only the consumer—in effect ignoring other factors that may be beyond an individual's control—may have limited success or none at all (Isenhour, 2014; Räthzel & Uzzell, 2019). Therefore, it is imperative to examine these types of issues within a framework that encompasses the diverse intrinsic and extrinsic elements that may influence a consumer's green purchasing behaviour.

The Behaviour Change Wheel (BCW; Figure 4.1) proposed by Michie et al. (2011) offers a systematic framework to not only understand the nature of the target behaviour, but also to guide appropriate interventions and policy. The inner circle of the BCW contains Capability-Opportunity-Motivation model of behaviour (COM-B), that serves to organise the different factors that can influence a consumer's pro-environmental behaviour. These factors may also interact in varying proportions to produce or prevent specific behaviours (Michie et al., 2011).

- Capability-related factors can refer to the physical skills necessary to perform the behaviour, as well as psychological aspects like knowledge, cognitive skills and the capacity to regulate behaviour.
- Physical opportunity would include environmental resources and contexts, while the influence of friends and/or friends would be considered social opportunity.

- Factors relating to motivation range from emotions and rewards (automatic motivation) to those relating to decision-making, including intentions, self-efficacy, etc. (reflective motivation).

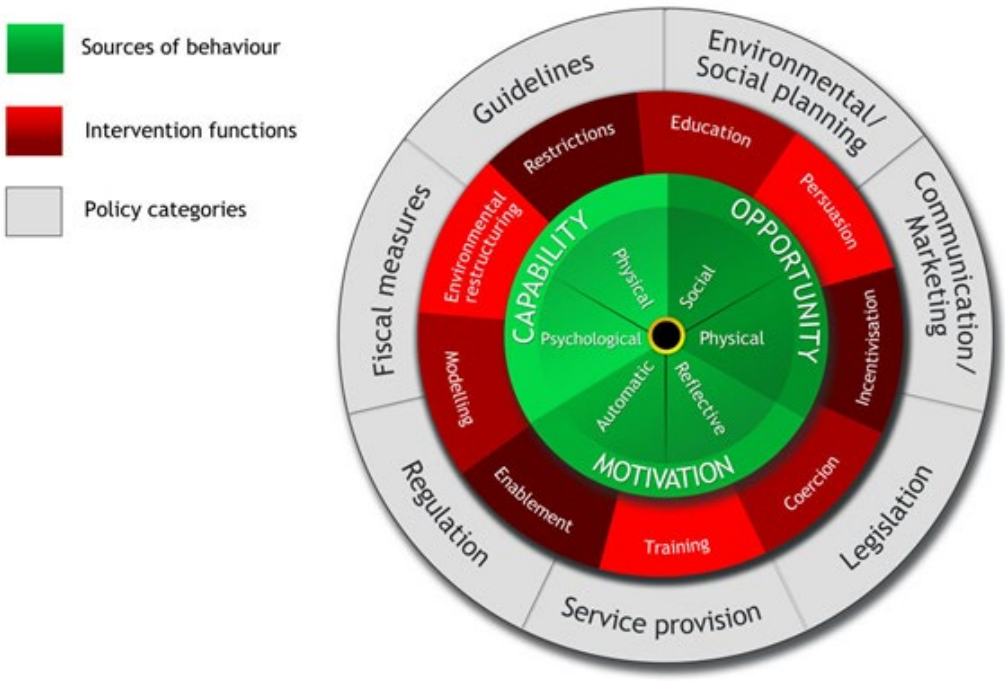

Figure 4.1. The behaviour change wheel. Reprinted from "The behaviour change wheel: A new method for characterising and designing behaviour change interventions," by S. Michie, M. M. van Stralen and R. West, 2011, Implementation Science, 6(42), p. 7. Copyright [2011] by Michie et al., licensee BioMed Central Ltd. Used under Creative Commons Attribution License: http://creativecommons.org/licenses/by/2.0

Once the barriers and drivers of a specific behaviour are identified, the BCW can be used to design corresponding interventions and inform policy changes, making this an important first step in promoting green behaviour.

Purchasing products that contain SPO has been identified by experts as an effective behaviour to address the palm oil crisis, which has a high likelihood of being adopted by Australian consumers, but is not currently widely practiced (Sundaraja et al., 2020). While previous research has highlighted a lack of knowledge as an important barrier, there could be other additional barriers that need to be identified, in order to design an effective intervention

(Lange & Coremans, 2020). The current study is situated in Australia, which ranks 44 in terms of palm oil imports (Workman, 2020), having imported 112152.61 tonnes in 2019 (TrendEconomy, 2021). Although not one of the top importers of palm oil, Australian food-related consumer behaviour may be comparable to other high-income industrialized countries like the United States, and the United Kingdom (*Appreciate consumer and retail trends for success*, 2018), which are comparatively larger importers of palm oil (Workman, 2020).

Barriers and drivers towards a specific consumer behaviour can vary from individual to individual and is influenced by one's perceptions. Therefore, utilising an interpretive epistemological approach, the current study was designed to answer the following questions:

(1) What barriers and/or drivers (relating to capability, opportunity, and motivation) influence Australian consumers to purchase (or not purchase) products containing SPO?
(2) Are there unique factors specific to SPO, that impact this consumer decision?

Materials and Method

Participants

In order to participate in this research, participants were required to be over 18 years of age and be fluent in English; they were informed that the study was going to explore their consumer behaviour around purchasing products containing SPO. Thirteen participants, who ranged in age from 24 to 73 (median age = 30), were interviewed, out of which ten participants were women. Three participants were full-time students, one participant was a retired pensioner, and another was a stay-at-home mother. Other professions included finance manager, operations manager, customer service, administration, high school teacher, yoga instructor, artist, and fund-raiser for a non-profit organization. Two participants stated that they purchased products containing only SPO, while three of them claimed to avoid palm oil

altogether. Two participants reported abstaining from processed foods for health reasons, and therefore believed that they might be avoiding palm oil inadvertently. All other participants were unaware of their palm oil consumption.

Procedure

Participants were recruited using a variety of methods. From a previous preliminary survey on the likelihood of adoption and current engagement in various palm oil-related pro-environmental behaviour, participants were given the option of volunteering for the current study. However only one participant from this sample consented to be interviewed. Subsequently, recruitment posters (with an invitation to participate in a study exploring factors that might influence people to purchase or not purchase products containing only SPO) were put up in locations of community gathering (e.g., churches, university campus and sports centres) in a regional town in New South Wales, Australia. In addition to this, posts with the same recruitment message were placed on social media requesting volunteers to participate in this study. These efforts resulted in an additional four individuals who volunteered their time for this study. As the overall number of participants was still low and data saturation had not yet been achieved, research participation credit was offered to first-year psychology students at a regional university known to have a diverse student body. In this way, eight more participants were recruited, which ultimately resulted in data saturation.

Qualitative Interview

All participants were interviewed by the first author, who is experienced in qualitative interviewing. Interviews were conducted face-to-face, or using a video-conferencing platform (i.e., Zoom), depending on accessibility. The semi-structured interviews were conducted based on an interview guide, structured on exploring factors relating to capability, opportunity and opportunity (Michie et al., 2011).

All participants were first asked about their frequency of purchasing products with SPO over the past 12 months, followed by open-ended questions of *"What do you think could be reasons for people to not look for or not buy products that have only sustainable palm oil in them?"* and *"What do you think could be reasons for people to make a conscious decision to look for and buy products that have only sustainable palm oil in them?"* They were subsequently provided with definitions of capability (*"Capability is the idea that you are able to do something. It can refer to the physical or psychological ability to perform the behaviour."*), opportunity (*"Opportunity includes all the factors outside of your control that allow you to engage in certain behaviours. It refers to the physical and social environment that enables or encourages certain behaviour."*), and motivation *("Motivation refers to the reasons why you might want to do something. These factors might make a person more or less likely to do a particular behaviour—in this case, purchasing products with sustainably sourced palm oil. We can think of this in terms of both internal reasons, specific to me, as well as external reasons – for example, I do something because I receive these external benefits or rewards."*). After each definition was provided, participants were then asked further questions pertaining to each category. While it is unusual to provide definitions in qualitative research, these were provided after the generic open-ended questions, to help participants (who were largely unfamiliar with SPO) generate numerous potential barriers and drivers across the COM-B framework, and to also understand what they might categorize under each. The length of interviews ranged from 19 to 38 minutes.

Data Analysis

All interviews were audio recorded and transcribed verbatim, after which they were subjected to framework analysis (Ritchie & Spencer, 2002). Framework analysis was originally developed as a qualitative analysis method in policy research (Ritchie & Spencer, 2002), that draws descriptive and explanatory ideas from the data by initially identifying

commonalities and differences across cases (Gale et al., 2013). While the COM-B framework guided the interview process, the interpretive approach was the basis upon which sub-themes were obtained from the data. The first step of framework analysis is familiarization with the raw data, and to this regard the first author conducted the interviews, transcribed the data, and read through all the interviews. The next step involves identifying a thematic framework, and to this regard the COM-B framework, upon which the interviews were conducted, naturally fit into the data. The three overarching themes were Capability, Opportunity, and Motivation. Step three is indexing, which is coding the data based on the thematic framework. Although the interview was structured such that it began with general questions, followed by category-specific ones, the thematic framework was applied to the interviews as a whole, using an inductive approach to identify codes. Line-by-line coding was done, and codes were categorised under either capability, opportunity, or motivation, based on the definitions provided above. In most instances, this categorisation was mirrored in the responses provided by the participants, but in some instances, interviewees struggled with the inter-relationship between thematic categories. Based on the COM-B, the coding of four interviews was done by two independent coders (first and third authors), both of whom have prior experience with coding and thematic analysis in qualitative research. Only minor discrepancies were present, which were easily resolved with either a double code or selecting the code which appeared to fit the data better. Based on this, the remaining interviews were then coded by the first author. It was noted that in a few interviews, respondents gave suggestions or ideas on what might be helpful actions for governments or retailers to take, to make it easier for consumers to purchase SPO. These were initially coded as a separate category, but in subsequent steps (as described below), several could be viewed as potential opportunities, and hence are reported below as such.

Following indexing, one has to next chart the data, by arranging summaries of data under the thematic framework. Charting was done in Excel, where related codes were grouped together and summarized into sub-themes under the COM-B thematic framework. The final steps include mapping and interpretation, which is done by identifying associations between themes, making within-case and between-case comparisons and explaining the findings (Ritchie & Spencer, 2002). Under the thematic framework, the sub-themes under Capability, Opportunity and Motivation for each interview were separated out, to assist with making within-case and between-case comparisons. Relevant quotations from interviews were also included in the thematic framework for illustrative purposes. The inductive, interpretive steps of grouping of codes into sub-themes, and its organisation and interpretations under the thematic framework, was discussed by the entire research team while referring to the corresponding interview excerpts.

Ethics

The study was approved by the Human Research Ethics Committee of the University of New England (Approval No. HE19-032) and in compliance with the recommended research ethics procedure. All participants read a detailed information sheet and signed a written informed consent agreement (which included consent to being quoted anonymously) prior to participation.

Results

The results are presented under the overarching themes of capability, opportunity, and motivation.

Capability

Sub-themes relating to capability mainly constituted the psychological capacity of consumers to engage in purchasing products containing SPO. This included knowledge,

cognitive abilities, and resources of time and energy. Affordability was the only physical capability sub-theme that emerged from the data. While all these sub-themes could relate to green consumption in general, there were some aspects of these that emerged as being specific to the palm oil issue.

Knowledge

Knowledge was a key sub-theme that was identified. Among all the participants that were interviewed, those who regularly purchased SPO stated that knowledge was potentially a strong driver of their sustainable choices, while respondents who did not purchase SPO indicated that knowledge was a barrier to their SPO purchasing behaviour. When asked in general about what might stop consumers from purchasing products containing SPO, a lack of adequate knowledge and awareness ('*I think it's a lack of education. I just think a lot of people don't even realize that palm oil is in anything – I don't think they would know what palm oil does in the environment…*') was the most frequently cited barrier. Not possessing requisite knowledge was reported to be an obstacle in a number of ways in the context of palm oil, such as knowing about the dangers of unsustainable palm oil (not only its environmental impact, but also its impact on communities), knowing what consumer products contained palm oil in them ('*I don't know what it's in! It* [palm oil] *must be in a lot of things that you wouldn't know.*'; '*I'm not even aware of what products have palm oil,*'), knowing that an option of SPO existed and what this might mean ('*So there's a difference between palm oil normally, versus sustainable palm oil?*'), knowing what brands endorsed the use of SPO, and knowing how to identify SPO products ('*It would be great to have resources in shopping centres, or more websites, even government health websites, about what labels are good to purchase from.*'). Some of these were spontaneous responses from merely introducing the interview. Inversely, most participants stressed awareness and the importance of knowing about SPO and what products contained it, in response to being asked why people

might make a conscious decision to purchase SPO products ('*If people were aware of it, they'll probably look more frequently for it,*', '*I think awareness would be a major factor for a lot of people, because I don't think many people do know,*', and '*I would easily go and change my purchasing behaviour, if I knew what the alternatives were.*'). One participant who self-reported as being environmentally conscious was surprised by her own lack of knowledge on the issue ('*I haven't really ever seen programmes or like anything on palm oil, which is surprising because I would consider myself as someone who does care about the environment and who's wary of that, so the fact that I haven't really heard about it really, and that I haven't looked into it is strange I would say.*').

Cognitive Abilities

While knowledge was presented as a barrier to SPO consumption, when exploring factors around capability, some participants alluded to deliberate decision-making around use of SPO based on awareness and knowledge, which depended on one's cognitive faculties. In the words of one participant who frequently purchases SPO products, '*…skill required, and a cognitive ability to make a deliberate choice. And what I mean by that is making an informed choice – yes with the knowledge, but actually being able to think through that. So, you have knowledge, but you actually have to think through the knowledge that you have… "I'm going to work through this argument, and make a decision," and a commitment…a cognitive process of deliberation and thought…the ability to process through the knowledge*'. Among the environmentally conscious participants who reported knowing about the palm oil issue, their decision to either purchase SPO or boycott palm oil altogether stemmed from the messages that they had been exposed to (e.g., via social media). These confusing and potentially contradictory messages could potentially pose another barrier to unified consumer action., requiring people to possess '*the capability of critical thinking'.*

Resources of Time and Energy

Another sub-theme that emerged was the barrier of possessing limited resources of time and energy required was a barrier to SPO purchasing. For example, participants reported that products with SPO are rarely labelled in a clear and visible manner ('*It can sometimes take work to look at products and try to find information to see, does this have sustainable products in it, or what's this, where is this from, where is this made…that takes energy and effort to do,*'). Further, respondents described attempts at taking constant pro-environmental decisions as being exhausting, as put by a participant who tries to be environmentally sensitive – '…g*eneral fatigue of having to change all these behaviours and make a difference...I think it can get a bit much sometimes...so it'll be easy to just go, "Ah stuff it!" and not bother.*' Another participant gave up on being environmentally conscious because, '*It was so exhausting – like there are so many barriers that I stopped* [engaging in pro-environmental behaviour].'

Affordability

All the interviewees mentioned decreased financial ability and increased product costs when asked about barriers in general. It was interesting to observe that participants tended to assume that SPO products would be more expensive and that '*If it's a lot cheaper to buy an unsustainable product, then the average person would probably choose the lower cost, not thinking about the actual impact it may have on the environment…*'. As put by another participant, '*That's always the difficulty with these environmental choices, is that sometimes they are expensive and if you don't have a lot of available funds to use, then making those choices are a bit more difficult.*' However, one interviewee acknowledged that in reality, there may not be a significant cost difference between SPO products and ordinary palm oil products – '*When we think about it logically, you know, it might be a difference of 25 or 50 cents. In the grand scheme of things, it doesn't make that much difference, but isn't it funny*

how people's minds think, "Oh that's more expensive." Anyway, I think we lose more money under the seat of our cars than that.' Even if cost differences are minor, one's financial ability can significantly impact purchasing decisions, as narrated by one environmentally conscious participant who was going through economic struggles – '*I was on Newstart* (Australian government welfare) *for a bit last year and I found that all of the things that I normally took for granted, that I would just buy, I didn't do that anymore. I wouldn't check ingredients as much for the social welfare element, because I was concerned about getting enough food and being able to pay the rent and move around the city...and I'm highly conscious of the things that I do buy, and I saw how it would influence my willingness to make sacrifices or purchase or not purchase things.*' Therefore, the freedom to make SPO purchasing choices depends on one's financial status and the cost difference between the sustainable version of the product and the unsustainable one, which could be an important barrier.

Opportunity

Opportunity-related factors are related to those that one has little or no control over, yet still influence behaviour. Sub-themes under opportunity include the obscurity of product labels, prominence of availability and ease of access to SPO products, as well as social norms.

Product Labels

Obscurity of product labels was mentioned as a barrier by all participants, with the need to have clear and legible labelling on products, but from various perspectives. Participants who were less familiar with the palm oil issue emphasized that SPO was quite obviously not visibly labelled on products, as they had not observed it. Some responses around this include: '*I can't say that I've seen many that are advertising sustainable palm*

oil…', '*Palm oil is not something I usually look for on the label…it never stood out to me as being obvious.*', and a suggestion of '*An obvious stamp in front of the label…I'm not even actually informed if there's a sustainable palm oil trademark or label like that…if we could somehow…make it really obvious on the labelling of sustainable products.*' On the other hand, the few participants who were quite familiar with the palm oil issue, agreed that prominent advertising was key ('*I do feel like often people will look at that* (a prominent label)*, even if they don't have sort of in-depth knowledge of what it means and go, "Well that must be a good thing, otherwise it wouldn't be on the front in big letters telling me that."*"), but also accused manufacturers of being deliberatively deceptive on their labels, particularly around not indicating that palm oil is an ingredient – '*Companies are still advertising vegetable oil and they don't say what it is as part of that. That makes me really angry! This is false advertising…*'. Finally, an observation on supermarket products in general was that often ingredients are written in very small letters, which can be difficult to read. Consumers need to be able to quickly scan product labels to check if palm oil or SPO is present. One participant in his 70s said, '*It's very hard to read what their products are made of, especially if it's something like palm oil, where it's got a negative feeling to it. So, they put it very small, so that people like me can't flat out read it!*', indicating that small lettering on product labels could also serve a barrier to SPO purchasing.

Availability of SPO Products

Another barrier that was repeatedly spoken about was lack of availability and ease of access to products containing SPO. Participants who were unfamiliar with the palm oil issue and the option of SPO did not know if products were readily available ('*Are there products on the market that are offering this…?*'), while participants who were more knowledgeable on this, indicated that SPO products were not easily accessible. One participant reported, *'I would drive 25 minutes to a particular grocery store, even though there were heaps nearby,*

that one it does organic and everything, sustainable palm oil, or palm oil-free…'. Several participants held the perception that SPO products are more likely to be found in specialized stores (e.g., health stores), rather than in supermarkets.

Social Norms

Finally, numerous participants mentioned their social environment, which could serve as either an opportunity-related driver or barrier. The few respondents who reported consciously purchasing SPO products attributed this consumer behaviour to discussions with a friend. In the words of one such participant, '*I've probably come from quite a unique sort of culture - and just my community…people who are quite a bit well-educated, conversations about palm oil are had ever so often, so it just comes up in general conversation.*' Inversely, participants who were unfamiliar with palm oil and SPO mentioned the lack of conversations around the topic in their social groups, providing statements such as, '*No-one around me really talks about it…no-one's ever really brought it up in the groups of people that I hang out with, about palm oil.*', '*We don't talk about these things anyway. I mean I've never had a conversation with anyone apart from you* [the interviewer] *about sustainable palm oil. Never, never come up in a conversation.*', and '*Sustainable palm oil production isn't one of the topics that comes up when we talk…, To be honest, I've never actually really had anybody talk about palm oil in the same way that they might actually talk about, for example, too much sugar, and those sorts of things.*'. The importance of one's immediate social circle was poignantly illustrated by one of the participants who self-reported as high on environmental concern – '*When I lived at college years ago, everyone used to buy Mi Goreng* [a brand of instant noodle]*, and we all knew that it contained unsustainable palm oil, although it was just what you did. Everyone did it, and because everyone was doing it, it was more socially acceptable. Although now, my circle, we all study environmental science, we're all very aware and try and use our purchasing power to a sustainable advantage. So now my*

immediate circle is against that kind of thing, so I think your social circle's highly influential.'.

Motivation

Motivation-related factors that participants listed were internal drivers and/or barriers of sustainable purchasing behaviour that could be applied to SPO consumer purchases. There were several sub-themes identified, including perceived consumer efficacy, emotions (guilt, pride, and satisfaction), concern (for the environment, for one's health, and/or for the wellbeing of future generations), moral compass, values, and shopping habits, some of which have special significance in the context of the palm oil issue. Some of these sub-themes may also interact with one another in interesting ways, as will be outlined. Out of these, some participants spontaneously mentioned concern and connection to the environment (including animals), being guided by one's moral compass (personal norms) and the emotion of guilt when one's purchases are guided by taste as versus sustainability, when asked about drivers of the purchase of SPO products.

Perceived Consumer Efficacy

Several participants alluded to a belief that one's consumer power can make a difference, which can be termed as perceived consumer efficacy, and is a driver of pro-environmental consumer behaviour. In the words of one participant, '*I think people who purchase more ethically are aware that when they spend money, it's like a vote towards the option that they think is ethically better… You might feel like you don't have a big of a voice on these kinds of issues, although making a purchase at the shop, between unsustainable and sustainable, if you go for the sustainable option, that's part of your voice and part of your power behind the issue.*' Consumers who reported being high on perceived consumer efficacy appeared to feel empowered and hopeful about having an impact environmental issues ('*That*

[environmental damage] *can be avoided in a very simple way of not supporting that company or the ones that don't do it in a sustainable way. And that is a very easy decision I can make to change.*'). On the other hand, low perceived consumer efficacy could be a barrier as it may lead to feelings of hopelessness and dejection – '*I'm not as sustainable as I used to be because yeah – seeing what was going on around me, and no-one doing anything and it was just me doing all the stuff and everyone else was just continuing the same old life – it can get a bit like, "Is this ever going to change? Are people ever going to change? Is this all for nothing?"*" Consumer power appeared to be linked to the relative ease with which one can engage in the desired behaviour. As acknowledged by one of the few participants who regularly purchased SPO products, '*I honestly think we have a tendency as human beings, to go with the easiest option*.'

Emotions

There are several emotions that could either act as a driver or a barrier to the purchasing of SPO products. Executing one's consumer power to purchase sustainable products can lead to a sense of pride and/or satisfaction in having done a 'good deed' ('*They actually feel good about it too. So, I definitely would say people feeling really good about their purchases, because it's sustainable, so it's good, right?*'). These emotional states can then further motivate individuals to continue to make sustainable purchases. On the other hand, consumers can also be driven by guilt, which if accompanied by perceived consumer efficacy, could result in a feeling of responsibility that leads to sustainable purchasing action. This was illustrated by two participants, both of whom self-described as environmentally conscious and were aware of the palm oil issue. One participant was diligent about purchasing SPO products but felt very guilty about purchasing a specific product containing ordinary palm oil ('*Well if I can, if I'm buying anything that has palm oil, I would try and purchase sustainable palm oil. If it doesn't have sustainable palm oil but it advertises palm*

oil, I may try and avoid it. I actually do avoid it, apart from one biscuit brand which is my husband's favourite, so I do occasionally buy it, but it's not without feeling some extreme guilt (nervous laugh).' The other participant who also reported guilt attempted to avoid palm oil altogether, and when talking about SPO product availability said, '*I just read the label and if it has any kind of palm oil in it, I try to avoid it. In the last 12 months I was guilty of buying Mi Goreng* [a brand of instant noodle] (nervous laugh) *which is like the number one for me…I stopped buying it completely, and I probably buy it once every 24 months, maybe once a year maximum – and it's just a naughty treat…*'. However, if the guilt becomes overwhelming, and the individual's perceived consumer efficacy is low, this could potentially lead to psychological distress and demotivation. One participant who had attempted to adopt several pro-environmental behaviours and then gave up on continuing with them expressed it in this way: '*…you're so hard on yourself if you do something that's not considered environmental, like I would be upset with myself and I'd feel like – like this horrible spiral of being exhausted and then hating yourself.*' Therefore, guilt appears to have the potential to either serve as a driver or as a barrier to sustainable purchasing behaviour, depending on how intense the guilt is and whether or not is accompanied by perceived consumer efficacy.

Concern and Care

Different participants emphasized concern and care in various contexts as being potential motivators that could encourage and drive consumers to purchase SPO products. Concern and care for the environment or for animals was highlighted as a strong motivator across interviews, particularly when it included a sense of connection. A mother of two young children narrated the following: '*I had my daughter - she was just born, and I was actually breastfeeding her at the orangutan enclosure, while the orangutan was breastfeeding her little baby, so it was a very special, very special moment. I think just that very – that sense of unification, coming from – she's a beautiful orangutan female with a baby,*

breastfeeding in as much the same way as I am, and caring and seeing that. And so that, for me, it was very rewarding, because it was just the most beautiful, humbling experience.' While not all participants who purchased SPO products had a personal, meaningful encounter as described above, they did report being impacted by social media videos and images of deforestation and primarily injured or dead orangutans. Inversely, these participants hypothesized that apathy, disinterest and not caring about the environment could be a potential barrier leading some consumers to not take into consideration the environment, while making purchasing decisions. Another focus of one's concern was on the wellbeing of future generations, and this seemed particularly important for older adults – '*Motivation can be very hard because it's so far down the line - it's not tomorrow or next year, it's 10, 20, 30 or 40 years down the track, which I won't be around to see… So, the only way you can get that motivation is to think of my grandkids and my great-grandkids, and what's the world going to be like when they are my age…* [what they] *are going to inherit from us, when I'm not there.*' Finally, some participants believed that most other people are strongly motivated by a concern for their health, and a few participants expressed this view themselves: '*I don't want to put toxins in my body. Environment is a second sort of stance for me. For me it's primarily health-based and it's very important to me, and no social pressure can sway me on my health.*'

Personal Values

Personal values and having a moral compass were described as potentially important motivating drivers, which could influence the purchasing of SPO products. A few participants reported taking up veganism and believed that the underlying motivation would be the same, if they were to purchase only SPO products, while for one participant, her moral compass and personal values were influenced greatly by her religious beliefs, which she interpreted as encouraging her to engage in sustainable practices ('*For me personally, as a Christian, I*

believe it's God who created the world and sustains it and we have a responsibility as His people to look after the world, and so doing what I can to care for the environment.'). Finally, some participants spoke about the influence of habits – shopping for what is familiar, as a possible barrier to consumer behaviour change. As one participant put it, '*That's one of the hardest things isn't it, for us to do as human beings…is to change our habits. Particularly our food habits…they are pretty well-ingrained…and sustained over years and years of practice.*' Even when consumers are well-intentioned and are equipped with the necessary knowledge, shopping habits and nostalgia could be difficult barriers to overcome, as palm oil is primarily found in food products that are most susceptible to these influences: '*So the product* [that I find hard to completely avoid] *is something I consumed before being educated about the effect of unsustainable palm oil. It was something that we shared in the family home and something that we all consumed...Maybe, it might be like nostalgic, it's like tasty - so maybe the taste associated with memories then...it's something that I enjoyed growing up.*'

To put them together, all factors relating to capability, opportunity and motivation are interrelated. One participant eloquently portrayed this interconnection: '*...if you don't have the knowledge leading up to that, you can't embrace the opportunity. So, I would say that knowledge – all things I spoke about in terms of capabilities, comes before opportunity. And then also if you're motivated enough, you would make those opportunities happen. So, you would seek out those opportunities.*' It appears that some combination of the above discussed themes and sub-themes, is what might best encourage consumers to purchase SPO containing products.

Discussion

The current study aimed to explore factors of capability, opportunity, and motivation, that influence consumers' decision making around products that contain SPO, as well as to identify unique factors specific to SPO that could impact these consumer decisions. The

results indicated that there are important barriers and drivers across the COM-B, such as knowledge, cognitive abilities, resources of time and energy, affordability, obscurity of product labels, prominence of availability, ease of access to SPO products, social norms, perceived consumer efficacy, emotions (guilt, pride, and satisfaction), concern (for the environment, for one's health, and/or for the wellbeing of future generations), one's moral compass, personal values, and shopping habits. While some of these are particularly important when attempting to encourage people to purchase SPO products, factors across the COM-B tend to be interrelated.

Knowledge about the issue—and what can be done about it—emerged as an essential psychological capability for pro-environmental behaviour change; this has been supported by previous research (Hines et al., 1987; Hungerford & Volk, 1990; Joshi & Rahman, 2015; Lange & Coremans, 2020). Moreover, consumers may be unaware about palm oil being an ingredient in a wide range of food and non-food products, even if they are high on environmental concern (Aguiar, Martinez, & Caleman 2018). In addition to possessing the requisite knowledge, participants mentioned that one also needs to possess the cognitive abilities to use this knowledge, think critically and arrive at a consumer decision. Comprehension, reasoning, and remembering relevant information at the time of making purchases is important (Young et al., 2010). As palm oil is a very complex issue, attaining this knowledge can be quite difficult (Isenhour, 2014). Further, information on the complexity of supply chains and distribution networks (Dauvergne, 2018) is not easily accessible to the average consumer.

Environmentally conscious participants reported either avoiding palm oil or purchasing SPO, indicating that there is no clear understanding of what the desired behaviour ought to be. Further, there are conflicting messages, which make it difficult for consumer decision-making (D'Antone & Spencer, 2015; Isenhour, 2014). For example, would the best

course of action be to purchase SPO or to boycott palm oil altogether (D'Antone & Spencer, 2015)? Research has suggested that the best course of action is encouraging the purchase of SPO (Parsons et al., 2020; Sundaraja et al., 2020; Wilcove & Koh, 2010), but there are some non-governmental organisations that advocate boycotts.

Affordability was a physical capability factor that was frequently and spontaneously mentioned and could be an important obstacle (Barbarossa & Pastore, 2015; Joshi & Rahman, 2015), even in well-intentioned consumers. Interestingly, framing the barrier as "a higher price" views it as an external factor, while terming it as "unwillingness to pay" (as has been done in prior research; Moser, 2015) emphasizes consumer responsibility. In the interviews, participants appeared to view this as an external barrier, over which they have very little control over, particularly if they were in a difficult financial situation. Consumers' finances and other pressing priorities may influence their capacity to afford products that cost more because of their environment-friendly label.

Participants reported that there were only a few SPO options where they generally shop (and most had not noticed if they were present), speaking to the importance of product availability (Barbarossa & Pastore, 2015; Joshi & Rahman, 2015). It is important to note that SPO products may be available, but not easily visible. This could be due to the use of small letters, a sustainability logo that is not recognized, or manufacturers refraining from mentioning palm oil on the label due to the negative public perceptions surrounding it (Bicknell et al., 2018; Hinkes & Christoph-Schulz, 2019). Obscure labelling is quite unique to palm oil, making it a hidden ingredient in several food products, as regulations in Australia do not mandate that it be labelled as such (FSANZ, 2017). Often palm oil is subsumed under a generic "vegetable oil," or several technical terms (of which there are more than 200; Orangutan Foundation, 2019) that are not likely to be recognized by the average consumer. One participant emphasised this in her interview and expressed anger at what was perceived

as deceitful labelling. These obscure product labels imply that identifying SPO products would require individuals to invest a significant amount of time and energy doing research and reading labels carefully (Isenhour, 2014). Further, research has shown that ecolabels, such as the RSPO certified SPO label, are rarely recognized (Ostfeld et al., 2019), as was also evidenced in this study. In this context, the use of mobile applications that scan barcodes may help consumers detect palm oil and/or SPO in products. However, if the proposed application only provides information on the presence or absence of palm oil (Jane, 2018), then consumers may continue to be deprived of the choice of SPO.

With contradictory information available, and reports on the inefficiency of sustainability certifications, people may hesitate to trust that a product truly contains SPO (Gassler & Spiller, 2018), as they cannot evaluate it personally (Vermeir & Verbeke, 2006). It is perhaps in this state of uncertainty that consumers may be most influenced by social information and norms (Vermeir & Verbeke, 2006). As mentioned by many participants, it was their social circle or peer group that brought the issue to their awareness and perhaps even led by example. More often than not though, palm oil is rarely spoken about in many participants' social circles.

Motivation-related factors that emerged from this study mostly pertained to sustainable consumption in general, and not specifically in the context of palm oil. While some participants avoided all processed foods (many of which contain palm oil) for health reasons, one participant emphasized the harmful health impacts of consuming palm oil, even though there is no clear evidence that palm oil is more harmful to one's health when compared with other vegetable oils (McNamara, 2010). Interestingly, consumers who tend to be more health-oriented are more likely to carefully read product labels (Cavaliere, De Marchi, & Banterle 2016), and subsequently have the potential to be more environmentally aware in their consumer choices (Ghvanidze et al., 2019). However, in the context of

sustainably sourced palm oil, the socio-environmental and health-related goals may not align for consumers, who might be pulled in competing directions, perhaps resulting in them choosing to avoid palm oil altogether.

Perceived consumer efficacy emerged as an important factor, both in this study and previous research (Hanss et al., 2016; Joshi & Rahman, 2015). In order to feel that they could make a difference, consumers need to believe that their involvement would drive a market for SPO. In addition, as indicated by the results, emotions such as strong feelings of environmental concern, empathy, connectedness, responsibility and guilt, as well as pride and satisfaction at having performed pro-environmental behaviour, serve to motivate people towards the desired behaviour (Elgaaied, 2012; Joshi & Rahman, 2015; Kaiser & Shimoda, 1999; Rees et al., 2014; Tam, 2013). While the interaction between emotional states and perceived consumer efficacy has also been illustrated in previous research (Antonetti & Maklan, 2014; Ghvanidze et al., 2016), this study additionally highlighted how guilt, in the absence of perceived consumer efficacy, may lead to hopelessness, distress and inaction, as the individual feels overwhelmed. This result ties in with the findings on research related to fear appeals, which indicated that in order to motivate pro-environmental action, triggering unpleasant emotions (like fear or guilt) needs to be paired with strategies that empower individuals to believe that they can make a difference (Witte & Allen, 2000).

There is, however, an alternate perspective that those low on perceived consumer efficacy might actually have a more realistic albeit disheartening perspective (Räthzel & Uzzell, 2019). While it is propagated that individual consumers can influence manufacturers and retailers of palm oil products (which would theoretically lead to forest and biodiversity conservation; Wilcove & Koh, 2010), this may not be entirely practical (Isenhour, 2014; Welch & Southerton, 2019). Some of the opportunity-related barriers that have been discussed, including obscure product labelling and reduced availability around SPO products,

need to be addressed by government policies, like a procurement policy of sourcing only SPO (Lange & Coremans, 2020), or mandatory legible product labelling in clear and easily understandable terms. These changes would allow for consumers to have the information needed to make informed purchasing decisions, and thus remove these barriers.

Implications

Understanding barriers and drivers of specific pro-environmental behaviour is essential to design effective and appropriate interventions (McKenzie-Mohr, 2011). The current study is the first to attempt to understand factors influencing green consumerism from a COM-B perspective (Michie et al., 2011), exploring general as well as specific drivers and barriers to purchasing products containing SPO. Unsustainable palm oil production contributes to deforestation and peat degradation in Southeast Asian rainforests, thereby destroying precious habitats, critically endangering several species, releasing copious amounts of carbon into the atmosphere, and polluting several countries (Wright et al., 2019). As such, there is an urgent need to address these substantial environmental and health concerns, while not restricting the economic development of palm oil producing countries and farmers.

Using the COM-B as a framework to understand factors influencing this important purchasing decision is useful, as it goes beyond an individual's motivation towards green consumption by incorporating information about barriers related to capability and opportunity, that have major implications in intervention design and policy development. The current study identified significant obstacles related to a lack of clear and directive knowledge, obscure product labels, and decreased visible availability of SPO products, highlighting the importance of governmental action and policy changes that are essential for tackling this issue at multiple levels, like a national procurement policy of exclusively importing SPO (Lange & Coremans, 2020).

As previously noted, labelling of palm oil currently is not mandatory; however, producers could elect voluntarily to disclose their use of SPO in product ingredient lists, as research has shown that consumers tend to have a positive attitude towards such disclosures (Riganelli & Marchini 2017). However, given the negative perceptions around palm oil, consumers might need to be given access to further information about sustainability certification processes (e.g., on websites, or in advertisements), not only on the environmental impacts of unsustainable palm oil, but also on the socio-economic benefits to smallholders and farm workers of purchasing SPO (Corciolani, Gistri, & Pace 2019). As such, it might be beneficial to invest in educational messages that promote SPO as an environmentally-friendly option, and one way of doing this could be supporting existing campaigns – e.g., Zoos Victoria's "Don't Palm Us Off" in Australia (Zoos Victoria n.d.).

Limitations

Various methods of sampling were adopted in order to conduct this study. It is possible that individuals who tend to be more environmentally conscious would be more likely to volunteer to participate. However, by offering credits to students from a regional university that is known to have a diverse cohort across all adult age groups, insights from those who do not self-report as high on environmental consciousness could also be gathered.

Conclusions

The current study looked at barriers and drivers for a specific pro-environmental behaviour—that is, purchasing products containing SPO. While several identified factors mirror those found by previous research, there are some barriers unique to palm oil: (1) the palm oil issue is very complex, and confusing messages make it difficult for consumers to know exactly what needs to be done, leading to some environmentally conscious consumers choosing to boycott palm oil entirely, while others decide to purchase SPO; (2) palm oil tends

to be a hidden ingredient, not always labelled clearly on the product, sustainable or otherwise, depriving consumers of the right to make informed decisions; and (3) SPO containing products may be less available and/or visible in stores. Existing palm oil-related campaigns use the orangutan as a mascot, a species very similar to human beings. This targets motivation as it offers consumers the opportunity to feel connected and empathize with the affected animals, which could be an important driver. However, although experts suggest that consumer power is essential to create and drive a market for SPO, the current study revealed the enormity of this task in the absence of simultaneous policy, structural, and marketing changes owing to capability- and opportunity-related barriers. Voluntary disclosures on product labels, educational campaigns on the socio-economic and environmental advantages of SPO, and having a procurement policy of sourcing only SPO nationally are some suggestions to reduce barriers to purchasing SPO. In the meantime, consumers might benefit from a barcode scanning mobile application that would provide them with immediate information on palm oil as an ingredient in supermarket products, but its success is dependent on manufacturers being transparent about their sourcing processes. Finally, future research can determine which COM factors strongly discriminate between those who do purchase SPO and those who do not, which can in turn inform a behaviour change intervention targeting factors that are deemed to be most influential.

Note: The data files (interview transcripts, codes, themes, and framework used for data analysis) associated with this project are located in a public repository and can be found at https://hdl.handle.net/1959.11/27981. The associated DOI is 10.25952/5e3369034fe11.

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Higher Degree Research Thesis by Publication

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STATEMENT OF ORIGINALITY

(To appear at the end of each thesis chapter submitted as an article/paper)

We, the Research Master/PhD candidate and the candidate's Principal Supervisor, certifythat the following text, figures and diagrams are the candidate's original work.

Type of work	Page number/s
Text (inclusive of tables)	87 – 124

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University of New England

STATEMENT OF AUTHORS' CONTRIBUTION

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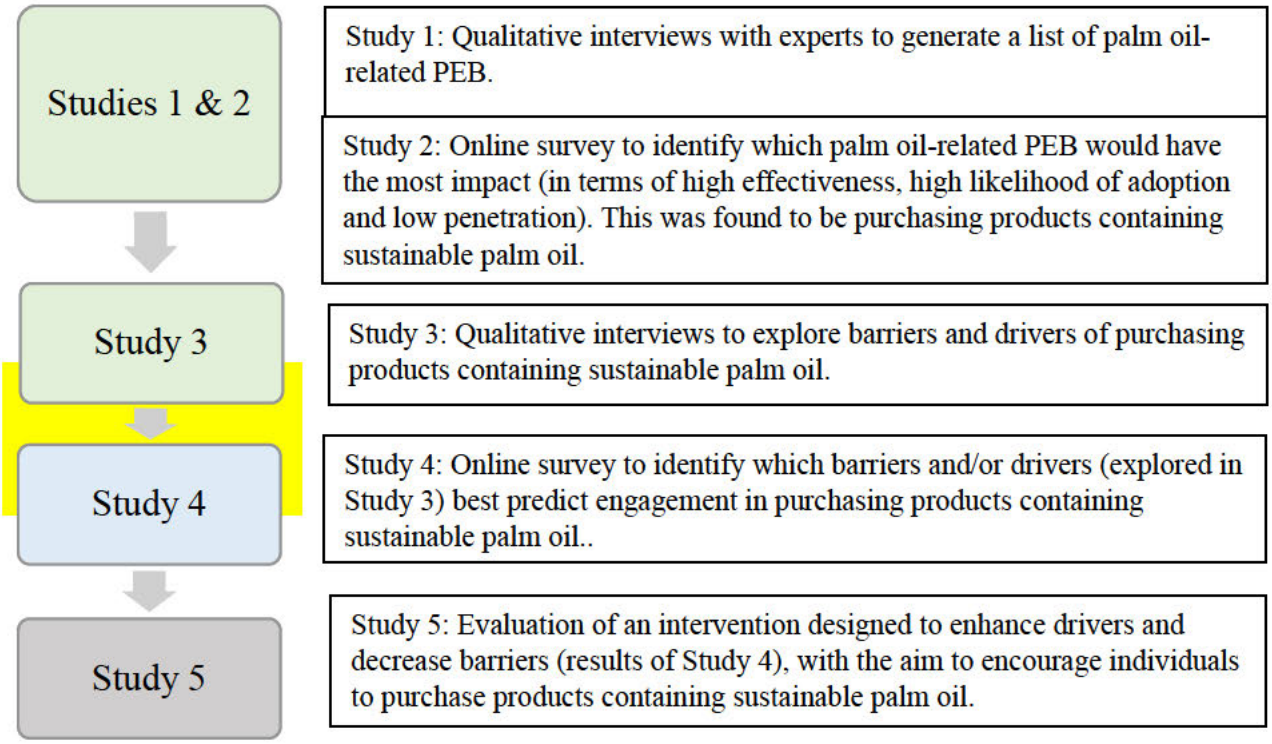
Research Progression to Study 4



Study 3 explored the various barriers and drivers that Australian consumers might experience in the context of purchasing products containing sustainable palm oil (SPO) while supermarket shopping. Based on step 2 of CBSM but guided by the Capability-Opportunity-Behaviour model of behaviour, this study elicited several important factors including knowledge, cognitive abilities, resources of time and energy, affordability, obscurity of product labels, prominence of availability, ease of access to SPO products, social norms, perceived consumer efficacy, emotions, concern, one's own moral compass, personal values, and shopping habits. Continuing from these findings, Study 4 aimed to use these identified barriers and drivers of SPO consumption to develop a Palm Oil-related COM-B survey. This survey would then be used to determine which COM-B factors might best predict SPO purchasing behaviour. Understanding key predictor barriers are particularly important in order to design an appropriate intervention to assist consumers in overcoming barriers to SPO purchasing (step 3 of CBSM).

CHAPTER FIVE

Study 4

Palm Oil: Understanding Barriers to Sustainable Consumption

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Manuscript submitted to: PLoS One (Public Library of Science)

Status of Manuscript: Published

Submission Dates: Received 8 December 2020; Received in revised form 30 March 2021; Accepted 6 July 2021; Published 18 August 2021

Citation:

Sundaraja, C. S., Hine, D. W., & Lykins, A. (2021). Palm oil: Understanding barriers to sustainable consumption. *PLoS One 16*(8), e0254897. https://doi.org/10.1371/journal.pone.0254897.

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Abstract

Palm oil is relatively inexpensive, versatile, and popular, generating great economic value for Southeast Asian countries. However, the growing demand for palm oil is leading to deforestation and biodiversity loss. The current study is the first to employ a capability-opportunity-motivation (COM-B) framework in green consumerism, to determine which capability, opportunity, and motivation factors strongly predict the intentional purchasing of sustainable palm oil products by Australian consumers (N = 781). Exploratory factor analysis revealed four main types of predictors of SPO purchasing – *Pro-Green Consumption Attitudes, Demotivating Beliefs, Knowledge and Awareness,* and *Perceived Product Availability*. Multiple regression revealed that these four factors explained 50% of the variability in SPO purchasing behaviour, out of which *Knowledge and Awareness* accounted for 18% of the unique variance. *Perceived Product Availability* and *Pro-Green Consumption Attitudes* were also significant predictors but accounted for only 2% and 1% of unique variance, respectively. These results provide a valuable foundation for designing behaviour change interventions to increase consumer demand for sustainable palm oil products.

Keywords: sustainable palm oil, green purchasing, COM-B, barriers, drivers

Introduction

The focus on global climate change intensified in 2019 with the unprecedented ferocity of the bushfire season in Australia, dubbed as the “Black Summer”, owing to high temperatures and the pre-existing drought ("Australia's devastating bushfire season comes to an end," 2020; Snape, 2020). The ongoing fire season in western United States is anticipated to mirror the conditions seen in Australia, exacerbated by increased temperatures and a slow recovery from drought (Deacon, 2020). Additionally, the Atlantic hurricane season has seen devastating storms hit parts of the United States of America, which could be due to warmer ocean temperatures that fuel cyclones (Chow & Williams, 2019). The year 2019 also saw an increase in the worldwide destruction of tropical rainforests, despite commitments made by companies and governments to decrease deforestation by 2020 (Fountain, 2020). While children – inspired by Greta Thunberg, a teenage environmental activist – left schools to protest climate-related inaction (Irfan, 2019), tropical forests in the Amazon region (Slezak & Doman, 2019) and in South East Asia ("Indonesia haze causes sky to turn blood red," 2019; Wright et al., 2019) continue to burn for agricultural purposes. These main belts of tropical rainforests are essential for regulating global and local temperatures (Wolosin & Harris, 2018), the destruction of which has huge implications for climate change.

The idea that population growth and rates of human consumption cannot be sustained and are causing irreparable damage to the environment has been around since the late 1960’s and early 1970s (Ehrlich, 1968; Fisk, 1973; Meadows et al., 1972). There have been warnings about planetary boundaries and thresholds being crossed with respect to climate change, land use and biodiversity loss, which threaten a safe operating space for humanity (Rockström et al., 2009). The exponential growth of industrialization and food production has been feared to lead to an impending collapse (Colombo, 2001; Meadows et al., 1972). Almost 50 years later, the message continues to be the same – our patterns of consuming food, water, energy and

other natural resources need to change in order to effectively address environmental challenges (Ruby et al., 2020). At the same time, there is concern about economic development and progress, and ensuring that needs are met in under-developed and developing countries (Fisk, 1973; Ruby et al., 2020). With growing attention on the impact of unchecked agriculture on climate change (Rohila et al., 2017), this conflict between economic growth and environmental protection and preservation is well-illustrated with the issue of palm oil.

The oil palm crop is viewed by many farmers in Southeast Asia as a miracle crop due to its high yield, versatility, and relatively low production costs (Parsons et al., 2020). With the global market for palm oil growing rapidly, Indonesia and Malaysia rely on oil palm plantations for economic development and stability (Meijaard et al., 2018). Over 40% of oil palm plantations are run as family farms (Meijaard et al., 2018); as such, the livelihoods of these rural farmers rely on palm oil (Lee et al., 2013).

In order to keep up with the increasing demands for palm oil, however, tropical rainforests are cleared on a large-scale to make room for plantations, which has adversely impacted the biodiversity in Southeast Asia (Gaveau, 2017; Gilbert, 2012; Koh & Wilcove, 2008; Meijaard et al., 2018; Meijaard & Sheil, 2013; Wright et al., 2019). Several species, including the Bornean orangutan and the Sumatran tiger are now critically endangered. Moreover, these rainforests were often cleared using the popular slash-and-burn technique, releasing enormous amounts of greenhouse gases like carbon dioxide, as the peatlands under the forests are set fire to and drained (Basyuni et al., 2018; Carlson et al., 2012; Sheil et al., 2009). This burning literally turns the sky red in parts of Indonesia ("Indonesia haze causes sky to turn blood red," 2019), and the resultant haze (dubbed the ‘Southeast Asian Haze) causes acute respiratory illnesses and is estimated to have claimed over a 100,000 lives (Islam et al., 2016; Varkkey, 2012; Wright et al., 2019). More recent satellite monitoring has

identified that non-forested land may be burned more often than forested land, although the use of fire in deforestation continues to be used by both independent farmers and large companies (Gaveau et al., 2017).

A boycott of palm oil would not only be impractical (Wilcove & Koh, 2010) and hurt the interests of rural farmers, but would also merely displace the deforestation as palm oil has the greatest land-use efficiency among all other oilseed crops (Meijaard et al., 2018). Should another oil be used to replace palm oil, it would only result in increased crop-related deforestation elsewhere (Meijaard et al., 2018). Technological solutions, including creating synthetic oils to replace palm oil, are currently very expensive (Parsons et al., 2020). As a consequence, Parsons, Raikova and Chuck (2020) have proposed that promoting more "sustainable" practices in the palm oil industry may be the most feasible short- to medium-term for minimising its environmental impacts. The idea of sustainability initially took shape with the Brundtland Report of 1987, which stated that "Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs" (World Commission on Environment and Development, 1987, p. 41). It is generally agreed that dimensions of social, economic, and environmental sustainability are all relevant (Farrington & Kuhlman, 2010; RSPO, 2018b), although the relative importance of each dimension is subject to vigorous debate (Farrington & Kuhlman, 2010).

The Roundtable on Sustainable Palm Oil (RSPO) was set up in 2004 as a non-governmental body to regulate and certify palm oil based on certain sustainability criteria (RSPO, 2018a), and represents one possible pathway to increased sustainability. However, there continues to be scepticism and suspicion around the term sustainability, particularly because it is difficult to quantify and measure (Farrington & Kuhlman, 2010). Research into the efficacy of the RSPO in performing its role has received mixed results. One study that

reported lower rates of deforestation in RSPO-certified plantations also revealed that there were fewer intact forests there prior to certification (Carlson et al., 2018). In alignment with the dimensions of sustainability, there were no significant differences on environmental, social, nor economic metrics between RSPO-certified and non-certified plantations (Morgans et al., 2018). RSPO certifications have been accused of "greenwashing" palm oil by labelling it as sustainable, even when the sustainability criteria have not been entirely met (Environmental Investigation Agency & Grassroots, 2019; Lang, 2015; Rahmawati, 2014; Sundaraja et al., 2020). Even after a recent revision of the RSPO's Principles and Criteria (RSPO, 2018b), the 2019 case studies continue to highlight its shortcomings (Environmental Investigation Agency & Grassroots, 2019). Although advocating for the purchase of sustainable palm oil products is far from a perfect solution, many argue that it may be the best solution currently available (Meijaard et al., 2018; Sundaraja et al., 2020; Wilcove & Koh, 2010).

A primary goal of the present study was to identify and understand which factors promote or discourage the purchase of sustainable palm oil. The literature on drivers and barriers of green, sustainable, and ethical consumption is diverse and growing (e.g. Bray et al., 2011; Carrington et al., 2010; Gleim et al., 2013; Mainieri et al., 1997; Moser, 2015; Vermeir & Verbeke, 2006; Young et al., 2010). In their systematic review, Joshi and Rahman (2015) examined 53 empirical articles (published between 2000 and 2014) on green purchasing behaviour and intention. Across habitual and one-time purchases (e.g., plastic-free products and an energy-efficient washing machine respectively), they identified a list of individual (emotions, habits, perceived consumer efficacy, perceived behavioural control, values, personal norms, trust in green products, and knowledge about environmental issues) and situational factors (price, product availability, social norms, product attributes and/or

quality, store-related attributes, brand image, eco-labelling and certifications) that were important (Joshi & Rahman, 2015).

Quantitative studies in green consumerism tend to focus on a relatively narrow range of sustainable consumption predictors like willingness to pay and personal norms (Moser, 2015), or self-efficacy (Hanss et al., 2016), which risks ignoring other factors that may influence consumer decision-making and behaviour. Further, studies that investigate green behaviour in general may overlook unique barriers to specific green consumer behaviours (e.g., the consumption of SPO).

Few studies have explored specific barriers and drivers to green purchasing behaviour beyond motivation-related factors (Barbarossa & Pastore, 2015; Isenhour, 2010, 2014), and we found only one that focussed directly on purchasing SPO products (Isenhour, 2014). This Swedish ethnographic study stressed the importance of limited available information and numerous choices, as well as the difficulties consumers face with respect to the complexity of the palm oil issue combined with limited time to research the environmental issue (Isenhour, 2014).

Although there has been considerable research on green consumerism, the field lacks an integrative framework for organising all the potential drivers and barriers to the purchasing of green products. The behaviour change wheel (Figure 5.1) was developed by Michie, Van Stralen and West Michie et al. (2011), initially for applications in health psychology. It is a comprehensive framework for identifying the causes of behaviour, and linking these causes to appropriate behaviour change and policy initiatives (Michie et al., 2011). The inner circle of the behaviour change wheel contains Capability-Opportunity-Motivation (COM-B) factors that influence behaviour, and interact in varying proportions to

produce or prevent specific behaviours (Michie et al., 2011). These components can further be sub-divided as follows:

1. Capability: Physical (such as having the physical skills necessary to perform the behaviour) and/or psychological (which includes knowledge, cognitive skills, and the capacity to regulate behaviour). In green consumerism, capability can refer to knowledge on the environmental and/or social issue, and affordability or one's financial status (Joshi & Rahman, 2015).
2. Opportunity: Physical (referring to environmental resources and contexts) and/or social (the influence of friends, family, and/or society). Opportunities to engage in green consumer behaviour could be facilitated by visible branding on sustainable products, large eco-labelling, availability of green products, social norms , and the like (Joshi & Rahman, 2015).
3. Motivation: Automatic (under which emotions and rewards fall) and/or reflective (components of evaluation for decision-making including intentions, goals, self-efficacy, etc.). A consumer's motivation to purchase green products can stem from empathy, guilt, concern for the environment, perceived consumer efficacy, personal values, among others (Joshi & Rahman, 2015).

The COM-B model of understanding behaviour was proposed as a behaviour "system" where all three elements interact with one another to generate behaviour, which in turn affects these elements of capability, opportunity, and motivation (Michie et al., 2011). As there is no hierarchical structure among the COM components, all can have equally important influences on behaviour (Michie et al., 2011). However, in order to target a specific behaviour with an intervention, it is essential to identify where the main barriers lie – that is, within capability, opportunity or motivation (Michie et al., 2011).

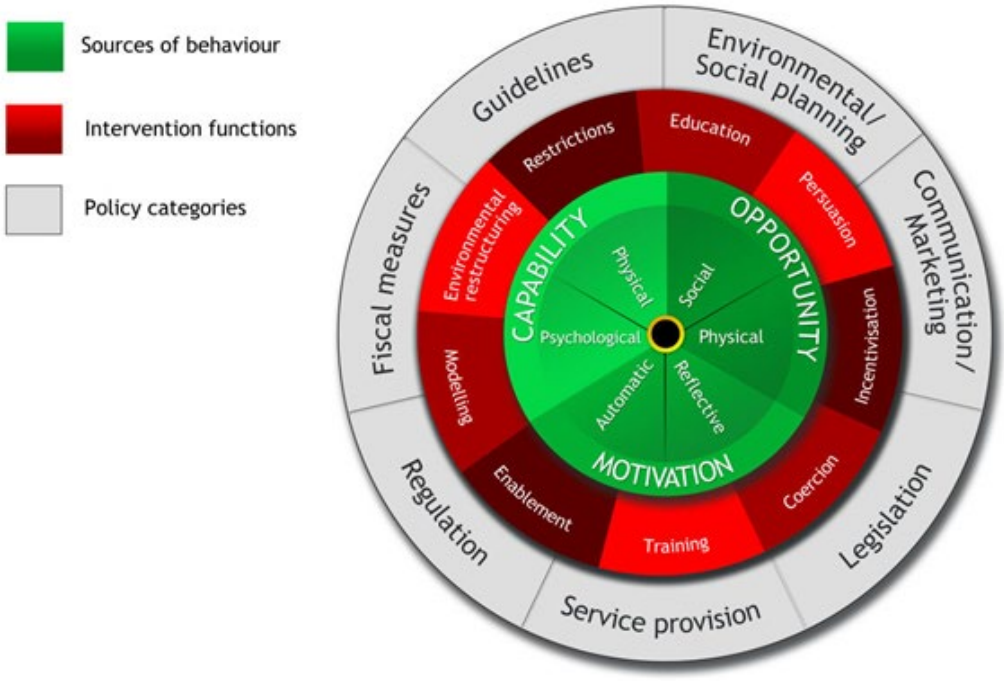

Figure 5.1. The behaviour change wheel. Reprinted from "The behaviour change wheel: A new method for characterising and designing behaviour change interventions," by S. Michie, M. M. van Stralen and R. West, 2011, Implementation Science, 6(42), p. 7. Copyright [2011] by Michie et al., licensee BioMed Central Ltd. Used under Creative Commons Attribution License: http://creativecommons.org/licenses/by/2.0

COM-B and the behaviour change wheel have mostly found their use in the field of health, to promote lifestyle changes like exercising more, reducing or ceasing smoking, and the like (Barker et al., 2016; Carney et al., 2016; Fulton et al., 2016; Gould et al., 2017; Munir et al., 2018). However, research in the pro-environmental space has rarely used the COM-B model and the current research is the first to explore its application in understanding and promoting green or sustainable consumption (which can be comparable to the health behaviours addressed by the behaviour change wheel in literature). Given that there are a variety of factors across the COM-B that could potentially influence the purchase of sustainable palm oil, it is essential to identify which specific barriers would need to be addressed in a targeted intervention in order to ensure optimal allocation of resources.

The current study builds on a preliminary study (Sundaraja et al., 2021), which was a qualitative research designed to identify the main drivers and barriers of SPO purchasing behaviour and then organise them according to the COM-B framework. Following this, the present research is a scale development and validation study in which a new measure is created in order to assess capability, opportunity and motivational factors relevant to the purchase of products containing SPO. Further, the factor structure of this measure and its capacity to predict self-reported SPO purchasing behaviour is also determined.

Preliminary Study (Sundaraja et al., 2021)

A preliminary research study (Human Research Ethics Committee Approval No. HE19-032; University of New England) interviewed 13 Australian consumers (aged between 24 to 73 years; median age = 30 years) with varying levels of engagement on sustainable palm oil purchasing behaviour. Some participants were recruited via recruitment posters put up in areas of community gathering (e.g., churches, the university campus, and sports centres) in a regional town in New South Wales, Australia, as well as on social media. In addition to this, research participation credit was offered to first-year psychology students at a regional university known to have a diverse online student body from all over Australia. All participants provided written informed consent. Participants were interviewed face-to-face, or using a video-conferencing platform (i.e., Zoom), by the first author, based on an interview guide. The interview questions explored various barriers and drivers relating to capability, opportunity, and opportunity (Michie et al., 2011), that play a role in decisions around SPO-related consumer behaviour. The length of interviews ranged from 19 to 38 minutes.

These qualitative interviews were subjected to framework analysis (Ritchie & Spencer, 2002) based on COM-B. Framework analysis is a means of qualitative data analysis that commences with identifying a thematic framework and then coding the collected data

based on this framework (Ritchie & Spencer, 2002). Once this is done, summaries of data are arranged under each thematic framework (known as charting), after which they are interpreted by identifying associations between themes, as well as making within-case and between-case comparisons, thereby explaining the findings (Ritchie & Spencer, 2002). A summary of these charted findings is listed in Table 5.1, and detailed information on data collection, analysis and results is to be published elsewhere (Sundaraja et al., 2021). The current study builds upon this research and aims to apply the COM-B framework to further understand which specific factors best predict engagement in sustainable palm oil-related consumer behaviour.

Table 5.1.

COM-B factors influencing the purchase of SPO

Capability	Opportunity	Motivation
Knowledge about the issue	SPO product availability	Empathy, compassion and love for the environment
Critical thinking	Legible, clear product labels	Guilt
Capacity to afford 'green' products	Visibility	Perceived consumer efficacy
Time	Social norms	Shopping habits
Energy		Values / Moral compass
		Health benefits

Materials and Method

Participants

The sample consisted of 781 adult participants from Australia who self-reported as the primary grocery/supermarket shopper in their household. A target sample size was determined by a power analysis. A study that studied drivers and barriers associated with the adoption of low emission agricultural practices among farmers, and thus had some parallels to the proposed study, found small effect sizes for their psychological variables (squared

semi-partial correlations ranging from <.01 to .10; Morgan et al., 2015). These variables reflected some aspects of the COM-B model. Based on this research, a small effect size of f^2=.02 (Cohen, 1988; Henseler et al., 2009) is predicted. Assuming a target power of .90, 10 predictors and an α level of .01, a power analysis using G*Power (Faul et al., 2009) suggested a minimum sample size of 748 participants.

All participants were sourced using a survey panel from Qualtrics™, an online database and survey administrator (Qualtrics, Provo, UT). Qualtrics' samples come from market research panels and respondents are invited to participate in various ways, often via an email invitation. Other means of invitations include displaying surveys when potential respondents sign into a panel portal, or the use of in-app and SMS notifications. To avoid a self-selection bias, survey invitations do not include specific details about the contents of the survey and are instead kept very general (i.e., information that the survey is for research purposes only, how long the survey is expected to take, and what incentives are available).

The sample was representative across adult age groups, mapped on the national representative census data. Participants were predominantly female (498 women, 283 men) likely due to the screening procedures utilized to survey the member of the household that primarily does the grocery shopping. Although trends are changing, grocery shopping has been traditionally viewed as a female-centric gendered role, and recent surveys continue to indicate that women are more likely than men to perform routine grocery purchases (Bailey, 2013; Inside FMCG, 2015). Respondents had a mean age of 46 years (*SD* = 17.26, range = 18 to 83 years), and they reported having completed an average of 13 years of formal education. Almost three-quarters of the participants (73%) stated that they lived in an urban area (big city or large town) and 35% indicated an annual household income of less than 50,000AUD (the average Australian household income for 2017 to 2018 was approximately 55,000AUD; Australian Bureau of Statistics, 2019).

Measures

The measures used in this study included an indication of the existing frequency of sustainable palm oil-related consumer behaviour, and a specially designed palm oil-related COM-B survey, derived from the preliminary study described above. In addition to this, established measures of connectedness to nature, willingness to sacrifice for the environment and values were also administered, as these have been found to be significant predictors of pro-environmental behaviour in the past (Davis et al., 2011; de Groot & Steg, 2008, 2009; de Groot et al., 2008; Mayer & Frantz, 2004). This combination of a new measure and existing measures was used to see if the palm oil-related COM-B survey better explained sustainable palm oil consumer behaviour than previously used measures in this field.

Basic Socio-Demographic Details

Participants were asked relevant, non-identifying questions about age, sex, years of education, residence (urban or rural/regional), and annual household income.

Frequency of Sustainable Palm Oil-Related Consumer Behaviour

Four items on specific behaviour pertaining to the purchasing of products containing sustainable palm oil were included ("*At a supermarket/food store, how often have you intentionally looked for products that contain sustainable palm oil?*", "*How often have you intentionally purchased a product because it contained sustainable palm oil?*", "*How often have you avoided buying a product when you realized that it contained palm oil that was not sustainable?*", and "*How often have you returned a product to a store because it contained unsustainable palm oil?*"). Participants were asked to provide an indication of frequency of each behaviour on an 11-point scale, where 0 = "never" and 10 = "10 or more times." These four items were summed into a scale, which yielded a Cronbach's α of .85. Cronbach's α is a measure of reliability and determines the extent to which all items in a scale measure the

same construct (Tavakol & Dennick, 2011). Also referred to as internal consistency, it refers to the inter-relatedness of the items within the test (Tavakol & Dennick, 2011). For the current measure, Cronbach's α increased to .88 when the last item "*How often have you returned a product to a store because it contained unsustainable palm oil?"* was deleted, indicating that the scale's internal consistency improved without this item. As this last item also had a highly positively skewed distribution, with 81.4% of the sample reporting that they had never performed this behaviour, only the first three items were totalled and retained for subsequent analysis.

Palm Oil COM-B Survey

Based on interviews conducted with Australian consumers (preliminary study), several barriers and drivers of purchasing products with sustainable palm oil were identified (Table 1). These were then incorporated into a survey of 53 items that included items about capability (for example, knowledge about the environmental effects of the palm oil industry, affordability, limited resources of time and energy), opportunity (e.g., availability, clear and legible labelling of ingredients, discussions with friends/family, and social norms), and motivation (e.g., personal norms, habits, concern for future generations, satisfaction/pride, perceived consumer efficacy, concern for the environment, and trust in the quality of green products). Initially, all items were worded specific to sustainable palm oil. However, when these items were pilot-tested, it was discovered that if participants were unaware of the palm oil crisis and the option of sustainable palm oil, it was extremely difficult for them to answer the subsequent questions around COM-B. Therefore, a decision was made to retain the items assessing knowledge specific to sustainable palm oil, and to alter the other items to pertain to "green" or "sustainable" products in general. All items were rated on a 5-point scale of 1 = "not at all like me," to 5 = "just like me." These items were subjected to an exploratory factor

analysis, the details of which are summarised in the Results section. Cronbach's α for the scaled factors ranged from .79 to .95.

Connectedness with Nature Scale (CNS; Mayer & Frantz, 2004)

The CNS is a widely used scale in environmental research that assesses an individual's connection with nature with respect to their cognitions (i.e., beliefs). Fourteen items consisting of statements written in the first person are each rated on a 5-point scale, where 1 = "strongly disagree" and 5 = "strongly agree," which were averaged to provide a CNS score. This scale is reported to have high internal consistency (Cronbach's $\alpha = .84$), high test-retest reliability ($r = .78$, $p < .001$), and has demonstrated concurrent, convergent and discriminant validity (Mayer & Frantz, 2004). In the current study, the CNS had a comparable internal consistency with $\alpha = .86$.

Willingness to Sacrifice for the Environment (WTS; Davis et al., 2011)

The WTS is a 5-item measure of an individual's willingness to sacrifice their own needs for the sake of the environment. Each item comprised a 9-point Likert scale, ranging from 0 = "do not agree at all," to 9 = "agree completely." All five items were averaged to produce a WTS score. Previous research indicates that the WTS has high internal consistency (Cronbach's $\alpha = .88$; Davis et al., 2011), and correlates strongly with other measures of pro-environmental attitudes, including the New Ecological Paradigm (Dunlap et al., 2000), Inclusion of Nature in the Self (Schultz, 2002), and the CNS (Mayer & Frantz, 2004), with correlations ranging from $r = .35$ to $.60$ ($p < .001$; Davis et al., 2011). In the current study, the internal consistency of WTS was very high at $\alpha = .96$.

Adaptation of Schwartz's Value Scale (1992)

Based on Schwartz's original 56 values (Schwartz, 1992), de Groot and Steg (2008) developed a taxomony of those that are most relevant in the context of pro-environmental

behaviour. These are values related to the self-enhancement versus self-transcendent dimensions, and consist of egoistic, altruistic and biospheric value orientations (de Groot & Steg, 2008). Participants indicated to what extent each of the 13 values or items is important "as a guiding principle in their lives" on a 9-point scale (–1 = "opposed to my values," 0 = "not important," to 7 = "extremely important"). Following the original instructions (de Groot & Steg, 2008; Schwartz, 1992), participants were asked to vary scores as much as possible and to rate no more than two values as extremely important. Items under each scale (5 items for egoistic, 4 items each for altruistic and biospheric value orientations) were averaged to obtain the respective scale scores. As a measure of internal consistency, Cronbach's α in a European sample was found to be .74 for the egoistic, .73 for the altruistic, and .86 for the biospheric value orientations (de Groot & Steg, 2007), while in the current study, the internal reliabilities obtained were α = .84, α = .81, and α = .90, respectively.

Procedure

Participants were recruited via a Qualtrics™ online panel (Qualtrics, Provo, UT). Those who were below 18 years of age, and those who reported that someone else (apart from the participant themselves) primarily did the grocery and/or supermarket shopping for the household, were screened out of the survey. In the survey, all questions were mandatory (although participants could select "Rather not say" for the question about annual household income). Except for the socio-demographic and frequency of sustainable palm oil-related consumer behaviour (which were presented at the start of the survey, so that participants were not primed by their responses on measures of attitudes and values towards the environment and 'green' products), all other measures were presented in a random order, and items within each measure were also randomized. As attention-checks, two instructed-response items (e.g., "In order to check for attention, please answer '1' for this question") were incorporated into the palm oil-related COM-B survey. These instructed-response items have been known to be

useful in screening out careless responders, while still protecting the validity of the scale (Kung et al., 2018; Meade & Craig, 2012). Qualtrics™ screened out participants who failed either one of the attention-checks, or provided only partial responses. Additionally, a speed-checker was incorporated into the online survey. Participants whose response times were approximately below one-half of the average time taken to complete the survey in a soft launch (i.e., less than or equal to six minutes) were automatically screened out as well to ensure good data quality. As an outcome of the attention-check and speed-check screening procedures, 15 participants were screened out from an original dataset of 796, resulting in the current sample of 781 participants.

Data Analysis

Exploratory factor analysis and linear regression were run using IBM SPSS Statistics 26 (IBM corp., Armonk, NY, USA).

Ethics

The study was approved by the Human Research Ethics Committee of the University of New England (Approval No. HE19-223) and was conducted in compliance with the recommended research ethics procedure. All participants read an Information Sheet, after which they could provide implied consent by proceeding to the online survey.

Results

Participants reported low rates of engaging in sustainable palm oil-related consumer behaviour, with 40% of the sample reporting never having engaged in any sustainable palm oil-related action over the past year, including checking labels for sustainable palm oil products, avoiding products containing unsustainable palm oil, or purchasing products containing sustainable palm oil.

Exploratory Factor Analysis

The Palm oil COM-B survey consisted of 53 items, some of which were phrased as drivers and others as barriers. All the driver items were reverse-scored, so that in the analyses, all of the items reflected barriers to purchasing sustainable palm oil. The use of positively-worded and negatively-worded items, as well as the randomised order of item presentation for each participant, would help counter against common method bias (Podsakoff et al., 2003), but additionally, the Harman's single factor test was run, which revealed the total variance extracted by one factor is 30.33%, less than the recommended threshold of 50%. This indicates that common method bias is unlikely to pose a concern for this survey tool.

All items were then subjected to exploratory factor analysis, using the maximum likelihood extraction method, to determine the underlying structure of the variables and to reduce the data into more manageable units. The Kaiser-Meyer-Olkin measure of sampling adequacy was .95, and Bartlett's test of sphericity had a *p*-value of less than .001, which indicated that there were strong linear relationships within the data set. The number of factors to retain was decided based on Cattell's (1966) scree plot and Kaiser's (1960) rule (eigenvalues greater than 1). The scree plot indicated that three factors should be retained, whereas Kaiser's rule suggested nine. All possible solutions for three to nine factors were run using the direct oblimin rotation with Δ set to 0. A four-factor solution (*Pro-Green Consumption Attitudes, Knowledge and Awareness, Demotivating Beliefs and Perceived Product Availability*) was the most interpretable and accounted for 45% of the overall response variance.

Items that loaded greater than .45 on one factor with a cross-loadings of .35 or less were used to define each factor. Scale scores for each of the retained factors were computed by taking the average across the selected items for each factor, and were used for subsequent

analysis. Table 5.2 lists the items included under each factor, the mean and standard deviation (prior to reverse-scoring), and the internal reliability score for each factor, after all driver items were reverse-scored to represent barriers.

Table 5.2

Exploratory factor analysis pattern matrix loadings (N= 781)

Palm oil COM-B items	***M (SD)*[#]**	**Factor loading**			
		1	**2**	**3**	**4**
Factor 1 – Pro-Green Consumption Attitudes (Motivation; α = .95)					
I feel satisfied when/if I buy sustainable products. (R)	3.54 (1.18)	.81			
I feel proud when/if I buy green products. (R)	3.39 (1.23)	.81			
I feel responsible for protecting the environment by purchasing green products. (R)	3.36 (1.20)	.78			
I am concerned about preserving our planet for future generations. (R)	3.88 (1.10)	.78			
I see myself as a person who cares about the environment. (R)	3.92 (0.99)	.75			
I worry about the state of the planet, what we will leave behind for my children, grandchildren and great-grandchildren. (R)	3.78 (1.21)	.75			
I can make a difference to the environment if I purchase sustainably. (R)	3.54 (1.12)	.74			
I feel a strong personal responsibility to buy green products. (R)	3.13 (1.24)	.70			
I feel guilty when I purchase products that are bad for the environment. (R)	3.27 (1.30)	.68			
I believe that consuming green products benefits my health. (R)	3.43 (1.21)	.67			
It is important for me to purchase sustainable products. (R)	3.29 (1.18)	.65			
I empathize with animals that are affected by human farming activity. (R)	3.94 (1.14)	.61			
I see myself as a person who cares about animal life. (R)	4.15 (0.93	.58			

It is worth paying a higher price for green products. (R)	2.95 (1.26)	.55		
I generally take animal welfare into account while shopping. (R)	3.38 (1.27)	.54		
I can influence others around me by encouraging them to shop sustainably. (R)	2.92 (1.19)	.52		.31
Factor 2 - Knowledge & Awareness (Capability; α = .91)				
I am aware of the effects of palm oil production on forests. (R)	3.17 (1.47)	.93		
I am aware of the effects of palm oil production on certain animal species. (R)	3.09 (1.4)	.90		
I am aware of how palm oil production impacts locals in Southeast Asia (farmers, plantation workers, etc.). (R)	2.92 (1.42)	.86		
I know the difference between sustainable palm oil and ordinary palm oil. (R)	2.55 (1.39)	.70		
I know which products contain palm oil. (R)	2.40 (1.27)	.63		.32
I have heard about sustainable palm oil. (R)	2.89 (1.45)	.63		
Factor 3 - Demotivating Beliefs (Motivation; α = .79)				
It is exhausting to change my purchasing behaviour for environmental reasons.	2.59 (1.14)		.61	
I think that sustainable products are less tasty.	2.56 (1.15)		.57	
It is hard to give up products I like, even if I know they are not good for the environment.	3.17 (1.11)		.55	
I think that green products are often poorer in quality.	2.43 (1.16)	.34	.51	
It is inconvenient for me to purchase green products.	2.54 (1.11)		.50	
I feel that green products offer poor value for money.	2.93 (1.23)	.32	.48	
Despite my good intentions, I often forget to purchase green products.	3.12 (1.11)		.47	
I am often rushed for time when I go shopping for food and household supplies.	2.85 (1.29)		.47	
Getting the shopping done quickly is my top priority.	3.28 (1.28)		.46	

Factor 4 - Perceived Product Availability (Opportunity; α = .84)			
In a supermarket, I know where exactly (e.g. in which aisle) I can find green products. (R)	2.71 (1.28)		.64
I know where (e.g. in which stores) I can find sustainable products. (R)	2.80 (1.26)		.59
I can easily find sustainable products where I usually shop. (R)	2.98 (1.18)		.57
I carefully plan my purchases in advance so that I can buy green products. (R)	2.42 (1.24)	.33	.47

(R) indicates which items were reverse-scored; [#] Means and standard deviations for each item were calculated prior to reverse-scoring, so as to avoid confusion in their interpretation.

Multiple Regression

A multiple regression analysis was conducted to predict the frequency of SPO-related consumer behaviour, based on the COM-B factors (Table 5.2), as well as the measures on CNS, WTS and values. Together, the four COM-B derived factors explained 50% of the variance in the frequency of SPO-related consumer behaviour. A summary of the regression analysis is presented in Table 5.3. Further, including the CNS, WTS and Value Orientations (Egoistic, Altruistic and Biospheric) in the regression model only added an additional 1% to the amount of variance predicted in the outcome variable ($R = .72$, $R^2 = .52$, adjusted $R^2 = .51$, $p < .001$). Examining the beta-coefficients of the COM-B factors, it is apparent that *Pro-Green Consumption Attitudes*, *Knowledge and Awareness*, as well as *Perceived Product Availability* explained significant amounts of unique variance in the frequency of SPO-related consumer behaviour, with *Knowledge and Awareness* explaining the most amount of unique variance (18%). Therefore, these results indicate that reducing barriers associated with *Knowledge and Awareness*, *Perceived Product Availability*, and *Pro-Green Consumption Attitudes* are more likely to positively influence consumers to engage in more SPO purchasing behaviour.

Table 5.3.

Predicting purchasing of SPO products from the four COM-B factors of Pro-Green Consumption Attitudes, Knowledge, Demotivating Beliefs and Perceived Product Availability

Predictors[#]	*M* (*SD*)	B	95% CI for B		*r*	sr^2
			LB	UB		
Fewer Pro-Green Consumption Attitudes	2.51 (0.90)	-1.03*	-1.70	-0.36	-0.47**	0.01
Reduced Knowledge & Awareness	3.16 (1.18)	-3.96**	-4.42	-3.49	-0.68**	0.18
De-motivating Beliefs	2.83 (0.72)	0.53	-0.14	1.19	-0.15**	0.00
Lower Perceived Product Availability	3.27 (1.02)	-1.61**	-2.18	-1.04	-0.53**	0.02

[#] All predictors have been scored as barriers; * $p < .01$, ** $p < .001$, $R = .71$, $R^2 = .50$, *Adj* $R^2 = .50$

Discussion

This study was the first to adopt a systemic COM-B framework to identify specific barriers to the sustainable consumption of palm oil. The results revealed that barriers related to a lack of knowledge and awareness about the issue reduced perceived product availability, and fewer pro-green consumption attitudes best predicted engagement in SPO purchasing behaviour, which directly mirror Capability, Opportunity and Motivation (COM-B) respectively. These results, therefore, demonstrate the successful application of COM-B in the consumerism space, and illustrate its utility in understanding the nature of specific barriers and drivers to consumer PEB. While the COM-B model has been successfully implemented in understanding and modifying health-related behaviour (Barker et al., 2016; Carney et al., 2016; Fulton et al., 2016; Gould et al., 2017; Munir et al., 2018), its evidence-base in the pro-environmental space is in the early stages (McLeod et al., 2015). Further, our findings reinforce the idea that research focusing exclusively on internal motivation-related factors are likely overlooking essential impacts of capability and opportunity on the target behaviour (Isenhour, 2014; Räthzel & Uzzell, 2019). The current research reveals that factors

relating to all three categories of the COM-B are implicated in predicting the frequency of SPO-related consumer behaviour.

Close to half of the sample reported never engaging in any action related to purchasing SPO, which is unsurprising and perhaps reflective of the nature of barriers that consumers face (Isenhour, 2014; Sundaraja et al., 2020). This highlights the enormous potential to promote the purchasing of SPO in a behaviour change intervention. The lack of widespread knowledge about palm oil and the environmental and socio-economic issues that surround it emerged as a crucial barrier to consumer PEB change. The importance of knowledge for PEB has been supported by previous studies (Hines et al., 1987; Hungerford & Volk, 1990; Joshi & Rahman, 2015), although when compared to other PEB like recycling or energy conservation which are relatively well-known, individuals may lack specific knowledge about the impact of their consumer choices on the environment (Lange & Coremans, 2020). While prior research has indicated that the more knowledge consumers had about palm oil and its environmental impacts, the greater the intentions to change their consumption habits (Lange & Coremans, 2020), palm oil is a very complex issue, and so attaining relevant knowledge can be quite difficult and time-consuming (Isenhour, 2014). Further, there are conflicting messages on purchasing SPO and boycotting palm oil, which could confuse consumers as to which source of information and advice is trustworthy. Consumers may also find it difficult to distinguish between companies that adopt sustainable or unethical/unsustainable practices (Carrigan & Attalla, 2001). There is potential for future research to study how different levels of knowledge on palm oil (and its complexity) might relate to varying levels of engagement. However, consumers might engage more with the palm oil issue, if in addition to knowledge, clear, consistent, and directive information was provided and presented on product labels.

While clear, accurate and evidence-based knowledge is an essential capability to possess, that alone may be insufficient for purchasing SPO. The ease of availability of sustainable or green products is an important opportunity that facilitates green consumerism (Barbarossa & Pastore, 2015; De Pelsmacker et al., 2005; Joshi & Rahman, 2015; Young et al., 2010). Closely linked with product availability is visibility in places of shopping and clear labelling. Ingredients could be written in small letters, the sustainability logo used might be unfamiliar, and manufacturers may not label palm oil on their products due to the negative public perceptions surrounding it (Bicknell et al., 2018; Hinkes & Christoph-Schulz, 2019; Ostfeld et al., 2019). These further make it difficult for consumers to obtain accurate information about product availability and hence may not perceive that SPO products are readily available.

With respect to motivation-related factors, the term "pro-green consumption attitudes" in this study subsumes feelings of environmental concern, empathy, responsibility, guilt, and perceived consumer efficacy, as well as pride and satisfaction at having performed consumer-related PEB. All these elements are supported by previous literature on green consumer behaviour (Antonetti & Maklan, 2014; Elgaaied, 2012; Ghvanidze et al., 2016; Hanss et al., 2016; Joshi & Rahman, 2015; Kaiser & Shimoda, 1999; Rees et al., 2014; Tam, 2013). However, traditionally, there has been a focus on placing the heavy responsibility of sustainable purchasing entirely on a consumer (Moisander, 2007), effectively ignoring other factors (e.g., relevant capability and opportunity issues) that may be beyond a person's control (Isenhour, 2014; Räthzel & Uzzell, 2019). In this context, the current study addresses this by situating motivation alongside factors of the capability of possessing relevant and accurate information and the opportunity of perceived availability of products where people generally shop, rather than viewing it in isolation.

Implications

The continuing fiery destruction of tropical rainforests is a pressing issue, having implications in climate change, biodiversity loss, and human health and life (Wright et al., 2019). The current study is part of a series of step-by-step projects aimed at designing an effective intervention to assist with resolving the palm oil crisis. It is unique, as it the first to apply the COM-B model and the BCW to green consumerism. Understanding barriers that go beyond consumer motivation and individual responsibility is essential to design effective and appropriate interventions (McKenzie-Mohr, 2011; Michie et al., 2011). The results of this study highlight that any potential intervention to increase the purchase of SPO would not only need to increase concern for the environment, empathy, feelings of personal responsibility, and perceived consumer efficacy (relating to motivation), but more importantly address other barriers by: 1) providing adequate knowledge about the various aspects of the palm oil issue (enhancing capability); and 2) assisting consumers in finding SPO products (providing opportunity).

Limitations

An unavoidable limitation of this study was that the Palm Oil-Related COM-B survey's items (except those on knowledge and awareness) pertained to green consumerism in general, rather than being SPO-specific. Given that knowledge and awareness about the palm oil issue is not widespread among the general public, using SPO-specific items for the other barriers might have resulted in invalid data, as participants likely would have found it difficult to answer the questions if they did not know what SPO was. However, as a result of this essential modification in the survey items, the scale measures barriers to green consumerism in general, which is assumed to be the umbrella term under which purchasing SPO would fall.

Finally, even though participants reported a range of frequencies of their past SPO-related consumer behaviour, it is important to note that most people were at the lower end of the range, and hence very few people actually reported a high level of engagement in SPO-related purchasing. This could imply that there is increased scope for interventions to potentially increase the purchasing of SPO products.

Conclusion

We conducted a survey of 781 Australian consumers, and found that close to half the sample had never purchased products containing sustainable palm oil (SPO). Applying the Capability-Opportunity-Motivation model of understanding behaviour (COM-B), significant barriers to purchasing these sustainable products included a lack of knowledge about issues associated with palm oil production, uncertainty about product availability, and weak green consumption attitudes. These barriers significantly predicted low engagement in the target behaviour of purchasing products with SPO. As this study has successfully applied the COM-B model in the consumerism space, it lends support to the utility of applying this model and the larger Behaviour Change Wheel (Michie et al., 2011) in promoting other sustainable consumer behaviour. Finally, this study provides an important foundation for designing interventions to increase SPO consumer behaviour, as it highlights the specific internal and external barriers – beyond individual motivation – that need to be addressed.

Note: The data files for the preliminary qualitative study (interview transcripts, codes, themes and framework used for data analysis) associated with this project are located in a public repository and can be found at https://hdl.handle.net/1959.11/27981. The associated DOI is 10.25952/5e3369034fe11. The data files (data set and SPSS output files) for the current study, are located in a public repository and can be found at https://hdl.handle.net/1959.11/29488. The associated DOI is 10.25952/5f71639941626.

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Appendix A

Complete Palm Oil-COM-B Survey

There are many reasons why people do or do not purchase “green” or “sustainable” products that are **not harmful to the environment or do not deplete natural resources**. Please read each statement and indicate the extent to which it describes you.

1 = Not at all like me 2 3 4 5 = Just like me

I have heard about sustainable palm oil.

I know the difference between sustainable palm oil and ordinary palm oil.

I know which products contain palm oil.

I am aware of the effects of palm oil production on forests.

I am aware of the effects of palm oil production on certain animal species.

I am aware of how palm oil production impacts locals in Southeast Asia (farmers, plantation workers, etc.).

I can recognize brands which use sustainable palm oil in products.

Information about environmental impacts on product labels is often hard to understand.

I find green products expensive.

I am unwilling to pay more for green products.

I am often rushed for time when I go shopping for food and household supplies.

Getting the shopping done quickly is my top priority.

It is exhausting to change my purchasing behaviour for environmental reasons.

It is inconvenient for me to purchase green products.

Purchasing sustainably produced products is low in my list of priorities.

I regularly think about sustainability when shopping.

Despite my good intentions, I often forget to purchase green products.

I know where (e.g. in which stores) I can find sustainable products.

In a supermarket, I know where exactly (e.g. in which aisle) I can find green products.

I can easily find sustainably produced items where I usually shop.

The information given on product labels is insufficient to know if an item has been produced sustainably.

The information given on product labels is too small for me to easily read.

I rarely discuss environmental issues with my family and/or friends.

I rarely discuss shopping for green products with my family and/or friends.

I am worried that people will judge me for not buying green products.

Hardly any of my family and friends purchase green products.

My family and would be supportive if I purchased products with sustainable palm oil.

I feel a strong personal responsibility to buy green products.

It is important for me to purchase sustainable products.

Most of my purchases are habitual - that is, I tend to buy products that I have bought in the past.

It is hard to give up products I like, even though I know they are not good for the environment.

I rarely read all the ingredients on labels of products while shopping.

I am concerned about preserving our planet for future generations

I worry about the state of the planet, what we will leave behind for my children, grandchildren, and great grandchildren

I believe that consuming green products benefits my health.

I feel satisfied when/if I buy sustainable products.

I feel proud when/if I buy green products.

I find it very difficult to identify products that are sustainably produced.

I can influence others around me by encouraging them to shop sustainably.

I can make a difference to the environment if I purchase sustainably.

As a consumer, I have no power to bring about important environmental changes.

I carefully plan my purchases in advance so that I can buy green products.

I think that green products are often poorer in quality.

I think that sustainable products are less tasty.

I feel that green products offer poor value for money.

It is worth paying a higher price for green products.

I trust the information provided on labels about sustainability.

I feel guilty when I purchase products that are bad for the environment.

I see myself as a person who cares about the environment.

I see myself as a person who cares about animal life.

I empathize with animals that are affected by human farming activity.

I feel responsible for protecting the environment by purchasing green products.

I generally take animal welfare into account while shopping.

Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF ORIGINALITY

(To appear at the end of each thesis chapter submitted as an article/paper)

We, the Research Master/PhD candidate and the candidate's Principal Supervisor, certifythat the following text, figures and diagrams are the candidate's original work.

Type of work	Page number/s
Text (inclusive of tables)	129 – 166

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19/04/2021

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Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF AUTHORS' CONTRIBUTION

(To appear at the end of each thesis chapter submitted as an article/paper)

We, the Research Master/PhD candidate and the candidate's Principal Supervisor, certify that all co-authors have consented to their work being included in the thesis and they have accepted the candidate's contribution as indicated in the *Statement of Originality*.

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27/03/2021

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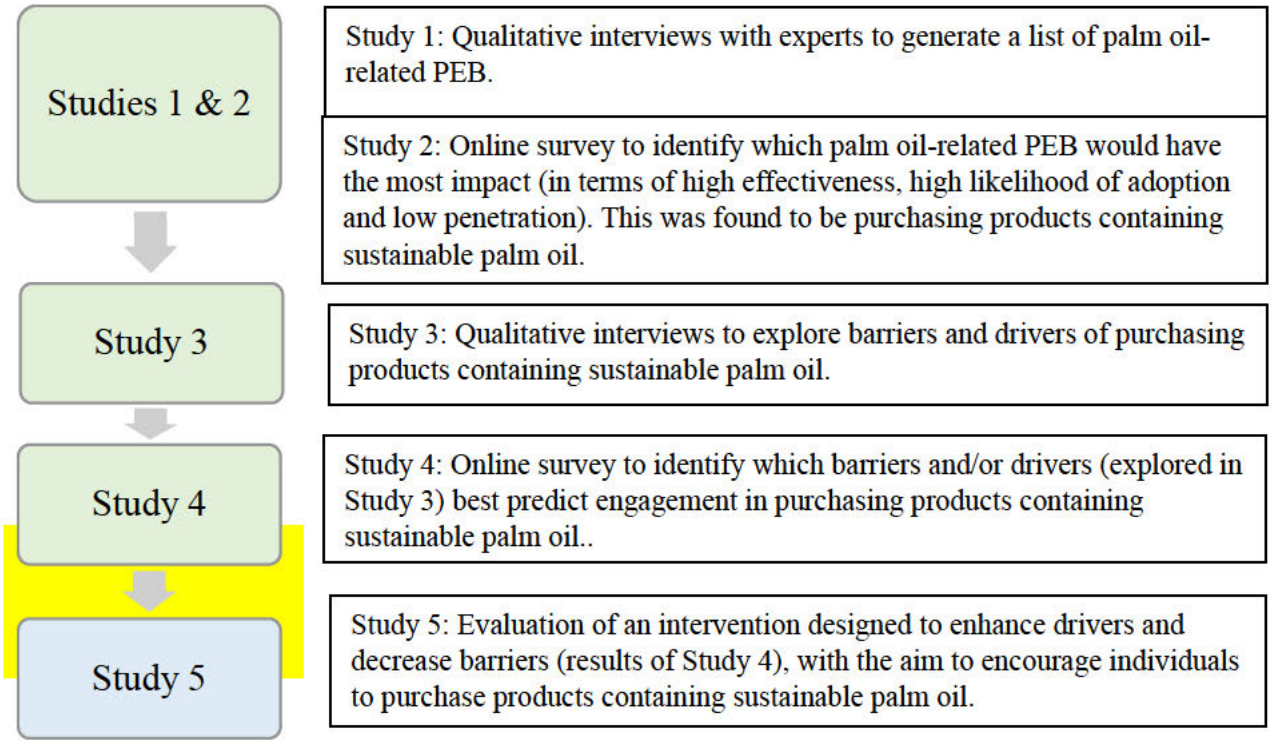
Research Progression to Study 5



Study 4 (step 3 of CBSM) revealed that almost half the sample (of 781 consumers) had never purchased products containing sustainable palm oil (SPO) and identified that a lack of knowledge about issues associated with palm oil production, uncertainty about product availability, and weak green consumption attitudes significantly predicted low engagement in the target behaviour of purchasing products with SPO. Continuing from this, step 4 of CBSM involves pilot testing intervention strategies. Based on the Behaviour Change Wheel (Michie et al., 2011), Study 5 aimed to design and evaluate an online behaviour change intervention in order to tackle the aforementioned barriers, so as to encourage consumers to purchase SPO products. Study 5 concludes the series of research studies that looked at understanding the palm oil issue, selecting a potentially impactful target behaviour (purchasing SPO), exploring and identifying barriers to SPO consumption, and finally designing an intervention to increase SPO purchasing behaviour among Australian consumers.

CHAPTER SIX

Study 5

Purchasing Products with Sustainable Palm Oil: Designing and Evaluating an Online Intervention for Australian Consumers

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Manuscript submitted to: Journal of Environmental Psychology

Status of Manuscript: Under review

Submission Dates: Submitted 12 February 2021

Citation:

Sundaraja, C. S., Hine, D. W., Thorsteinsson, E. B, & Lykins, A. (2021). Purchasing products with sustainable palm oil: Designing and evaluating an online intervention for Australian consumers. *Manuscript submitted for publication.*

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Abstract

Palm oil is a highly profitable commodity crop from Southeast Asia that is linked to widespread tropical deforestation, biodiversity loss, and greenhouse gas emissions. Preliminary research indicated that encouraging consumers to purchase products containing sustainable palm oil (SPO) could be a promising solution (Sundaraja et al., 2020). Based on the Capability-Opportunity-Motivation model of behaviour (COM-B), three key barriers that prevent consumers from purchasing SPO products were highlighted: a lack of knowledge and awareness about the palm oil issue, lower perceived availability of sustainable products, and fewer pro-green consumption attitudes. To address these barriers, 628 Australians were randomly assigned to one of three conditions in an online experiment: (1) a newly-developed interactive website on palm oil and SPO, (2) an existing promotional video on SPO, or (3) an interactive website on differentiating between real news and fake news (an attentional control condition). All participants completed pre-intervention and immediate post-intervention measures. At two weeks follow up, 403 participants completed the follow-up measures. Multivariate analysis revealed that the interactive website and promotional video increased both knowledge and the intention to purchase SPO (compared to the attentional control) but did not significantly impact follow-up self-reported SPO-related consumer behaviour. Lowered perceived product availability might help explain the intention-behaviour gap. Our results suggest that, in addition to increasing consumer capability and motivation, promoting sustainable consumption requires creating opportunities for people to engage in the desired behaviour.

Keywords: sustainable palm oil, online intervention, green purchasing, COM-B, interactive website

Introduction

Tropical rainforests and peatlands play an important role in mitigating the impacts of climate change by absorbing carbon dioxide from the atmosphere and storing carbon, while also maintaining water cycles and regulating global temperatures (Bonan, 2008; Humpenöder et al., 2020; Seymour & Busch, 2016; Wolosin & Harris, 2018). In fact, recent literature has emphasised that global net emissions can be significantly reduced if the destruction of rainforests and the draining of peatlands is stopped, and restoration efforts are focussed upon (Humpenöder et al., 2020; Seymour & Busch, 2016). Unfortunately, despite "no deforestation, peat, nor exploitation" (NDPE) commitments made by companies and governments to decrease deforestation by 2020, worldwide destruction of tropical rainforests continues to increase. (Fountain, 2020).

Palm Oil and Climate Change

Palm oil production is one of the chief deforesters in Southeast Asia (Gaveau, 2017; Gilbert, 2012; Koh & Wilcove, 2008; Meijaard et al., 2018; Meijaard & Sheil, 2013; Wright et al., 2019). A popular vegetable oil with a high profitability, owing to its increased yield and relative inexpensiveness (Meijaard et al., 2018), palm oil is grown by corporate plantations as well as family farms, also referred to as smallholders (Meijaard et al., 2018; Parsons et al., 2020). With over 40% of oil palm plantations run by smallholders (Meijaard et al., 2018), the livelihoods of these rural farmers rely on palm oil (Lee et al., 2013). The deforestation, however, is linked to the increasing global demand for palm oil, requiring forested lands to be cleared on a large-scale to make room for new plantations (Gaveau, 2017; Gilbert, 2012; Koh & Wilcove, 2008; Meijaard et al., 2018; Wright et al., 2019).

The ecological impact of this deforestation is seen in the dwindling biodiversity (Meijaard & Sheil, 2013; Sample, 2018; Wich et al., 2008). Further, these rainforests and the

peatlands upon which they grow release enormous amounts of greenhouse gases, such as carbon dioxide and methane, when cleared and burned (Basyuni et al., 2018; Carlson et al., 2012; Sheil et al., 2009).

Different solutions have been proposed, such as creating synthetic oils (Parsons et al., 2020), promoting more "sustainable" practices in the palm oil industry (Meijaard et al., 2018; Parsons et al., 2020; Sundaraja et al., 2020; Wilcove & Koh, 2010), and advocating a boycott of palm oil (https://www.palmoilinvestigations.org). However, experts agree that increasing consumer demand for sustainable palm oil (SPO) represents one promising potential solution (Sundaraja et al., 2020; Wilcove & Koh, 2010).

Behaviour Change Wheel

To design a behaviour change intervention to increase SPO purchasing behaviour among Australian consumers, we adopted the Behaviour Change Wheel (BCW; Michie et al., 2011). Behaviour can be influenced by factors of capability, opportunity and motivation (COM-B), and hence any behaviour change intervention would need to target one or more of these factors (Michie et al., 2011).

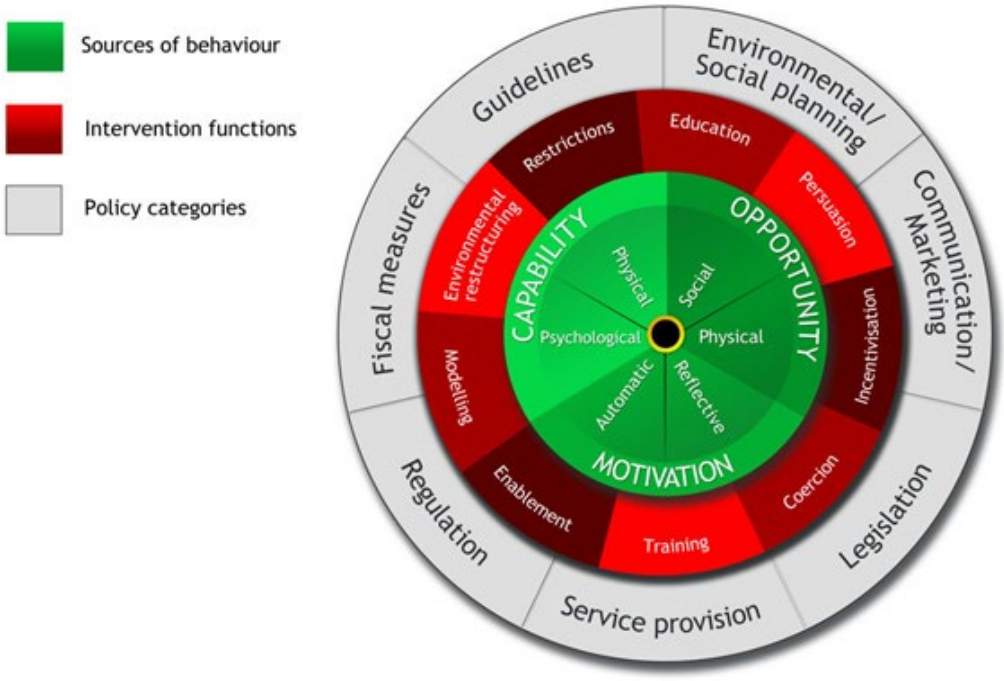

Figure 6.1. The behaviour change wheel. Reprinted from "The behaviour change wheel: A new method for characterising and designing behaviour change interventions," by S. Michie, M. M. van Stralen and R. West, 2011, Implementation Science, 6(42), p. 7. Copyright [2011] by Michie et al., licensee BioMed Central Ltd. Used under Creative Commons Attribution License: http://creativecommons.org/licenses/by/2.0

Designing interventions in line with the BCW has become quite popular in the field of health (e.g., Carney et al., 2016; Fulton et al., 2016; Gould et al., 2017), but has received comparatively less attention in the pro-environmental space. The BCW has been applied in designing interventions for the management of invasive animals in Australia (McLeod et al., 2015), and one case study examined it in the context of recycling behaviour (Gainforth et al., 2016). The latter concluded that focussing on motivation alone is insufficient to overcome the barriers to behaviour change, and providing opportunities (for example, access to trash bins) as well as the necessary knowledge are also essential (Gainforth et al., 2016).

Steg and Vlek (2009) compared informational and structural strategies, and concluded that informational strategies (e.g., education) are effective when the PEB is

relatively convenient and there are few external barriers. However, when PEBs are difficult or costly, structural strategies (e.g., akin to environmental restructuring, enablement) targeting infrastructure, finance, availability, and incentives, are necessary (Steg & Vlek, 2009). Although the BCW was not explicitly referred to in this review, it can be seen how the strategies discussed mimic certain intervention categories in the BCW (Michie et al., 2011). Michie et al. (2011) emphasised that each specific target behaviour has a unique combination of barriers across capability, opportunity and/or motivation, and therefore addressing the specific barriers is imperative in designing behaviour change interventions.

Green/Sustainable Consumerism

Increasing demand for sustainable palm oil can be usefully viewed under the lens of "green consumerism,", a topic that has attracted substantial attention (e.g., Bray et al., 2011; Carrington et al., 2010; Gleim et al., 2013; Mainieri et al., 1997; Moser, 2015; Vermeir & Verbeke, 2006; Young et al., 2010). In a recent systematic review, Joshi and Rahman (2015) concluded that both individual factors (e.g., knowledge, emotions, values, habits, perceived consumer efficacy, etc.) and situational factors (e.g., product price, availability, social norms, etc.) are important determinants of green purchasing intentions and behaviour. Several other studies in this area focussed on a relatively narrow range of sustainable consumption predictors that relate to motivational factors like willingness to pay and personal norms (Moser, 2015), or self-efficacy (Hanss et al., 2016), while a few studies have gone beyond motivation-related factors (Barbarossa & Pastore, 2015; Isenhour, 2010, 2014; Sundaraja, Hine, Alex, et al., 2021).

Within the green consumerism literature, we were able to find only three studies focussed directly on palm oil purchasing behaviour (Isenhour, 2014; Sundaraja, Hine, Alex, et al., 2021), all qualitative in nature. One was a Swedish ethnographic research over 17

months that highlighted situational barriers to SPO consumption (Isenhour, 2014), another had focus group discussions with German participants, exploring consumer attitudes towards palm oil (Hinkes & Christoph-Schulz, 2019), while the third was an Australian research study utilising framework analysis to understand consumers' perceived barriers to the purchasing of SPO (Sundaraja, Hine, Alex, et al., 2021). The importance of the complexity of the palm oil issue, the lack of sufficient information on palm oil and potential alternatives, having limited personal resources of time and energy, unclear labelling on products, palm oil being an ingredient in a wide variety of products, and holding negative attitudes about palm oil in general, were stressed upon as barriers towards the sustainable consumption of palm oil (Hinkes & Christoph-Schulz, 2019; Isenhour, 2014; Sundaraja, Hine, Alex, et al., 2021).

In general, interventional research on promoting green consumption is scarce when compared to other pro-environmental behaviours like recycling or energy conservation (Osbaldiston & Schott, 2012), although there are many studies in a comparable area of promoting healthier food consumption. A systematic review of literature on healthy food consumption reviewed 89 interventions across real and simulated environments, and concluded that interventions involving the manipulation of the product price or offering a financial reward appeared to be most influential (Hartmann-Boyce et al., 2018). While "swap interventions" (i.e., where consumers can substitute their regular food with a healthier option) were also found to be useful, educational interventions' effectiveness in simulated environments did not translate into real environments (Hartmann-Boyce et al., 2018). In BCW terms, interventions that manipulate capability and opportunity were found to be useful in getting people to make healthier food choices.

A Norwegian online grocery shopping experiment evaluated the effects of increasing knowledge and perceived consumer efficacy on sustainable purchasing (Hanss & Böhm, 2013). Across the course of over six months, there was no significant difference between the

intervention and control groups (Hanss & Böhm, 2013), highlighting once again that imparting knowledge (thus aiming to increase capability) and attempting to enhance perceived consumer efficacy (thus aiming to increase motivation) may not be sufficient for long-term behaviour change.

Only one intervention has been conducted in the palm oil space among Australian university students (Pearson et al., 2011). The researchers screened an emotive documentary, 'GREEN' (Rouxel, 2009) that focused on a dying orangutan's last days. The documentary also provided education on orangutans (their habitat, behaviour, and intelligence) and how one could help conservation efforts. Results indicated that short-term behavioural effects (e.g., making donations, responsible purchasing) were observed in 84% of the sample who returned the behavioural diary (attributed to increased knowledge and attitude change), but only 18% of the original sample reported long-term change after 10 to 12 weeks (Pearson et al., 2011). While this research proposed mechanisms of short-term behaviour change and attempted to examine barriers to longer-term change, it did not specify the pathways by which the intervention impacted behaviour. Further, yet again, this intervention targeted motivation (with the documentary) and capability (knowledge), without a clear understanding of the specific barriers that prevent people from engaging in palm oil-related PEB, and did not touch upon factors relating to opportunity.

The current study is one of the first to utilize the BCW (Michie et al., 2011) in the field of green consumerism, specifically in encouraging the purchase of products containing SPO. It draws on previous research that identified specific COM-B factors significant in predicting engagement in SPO-related purchasing behaviour, including actively checking labels for SPO, purchasing products containing SPO, and intentionally avoiding products because they contain unsustainably sourced palm oil (Sundaraja, Hine, & Lykins, 2021).

Knowledge/awareness (about the impacts of the unsustainable palm oil industry and the existence of SPO), *perceived product availability* (of SPO products, including knowing how to identify and locate them), and *pro-green consumer attitudes* (such as having concern and empathy for plant and animal life, perceived consumer efficacy, responsibility, etc.) were found to significantly predict the frequency of SPO-related consumer action (Sundaraja, Hine, & Lykins, 2021). The present study therefore aimed to design and evaluate an online intervention that addressed the COM-B factors of capability (*knowledge/awareness*), opportunity (*perceived product availability*), and motivation (*pro-green consumer attitudes*) in increasing SPO-related purchasing behaviour among Australian consumers.

Drawing from this previous study (Sundaraja, Hine, & Lykins, 2021), it was hypothesised that an intervention designed using elements from the BCW (Michie et al., 2011) would increase *knowledge/awareness*, *perceived product availability*, and *pro-green consumer attitudes* among Australian consumers as compared to the control condition. It was further hypothesised that by reducing barriers associated with these COM-B factors, consumers would report greater SPO-related consumer intentions and would also engage in more SPO-related consumer behaviour.

Materials and Method

Participants

The original sample consisted of 628 adult participants (330 women, 296 men, and 2 gender non-specific) living in Australia, who self-reported as the primary grocery/supermarket shopper in their respective households. All participants were sourced using a survey panel from Qualtrics^{TM}, an online database and survey administrator (Qualtrics, Provo, UT), and were randomly assigned to one of three treatment groups. The target sample size was determined by a power analysis. A small effect size of f^2=.02 (Cohen,

1988; Henseler et al., 2009) was predicted, based on research into drivers and barriers associated with PEB (e.g., adoption of low emission agricultural practices among farmers), which found small effect sizes (squared semi-partial correlations ranging from <.01 to .10; Morgan et al., 2015). Assuming a target power of .90, 3 groups, 7 measurements and an α level of .01, a power analysis using G*Power (Faul et al., 2009) suggested a minimum sample size of 364 participants at follow-up. Anticipating an attrition rate of approximately 40% as seen in Western pro-environmental longitudinal research (47% over nine months; Steinhorst & Klöckner, 2018), with a short follow-up period of two weeks (Deutskens et al., 2004). Figure 2 shows that how the 628 participants were distributed across treatment groups. Participants had a mean age of 49 years (*SD* = 15.50, range = 19 to 85), and they reported having completed an average of 14 years of formal education. More than three-quarters of the participants (77%) stated that they lived in an urban area (big city or large town). The follow-up measures were completed by 403 participants after approximately 2 weeks, with no significant difference in attrition across the three groups (*M* = 35.8% attrition, range = 31.7% to 40.2%, *p* = .60). The mean age of participants at follow-up was 49 years (*SD* = 15.07, range = 21 to 82).

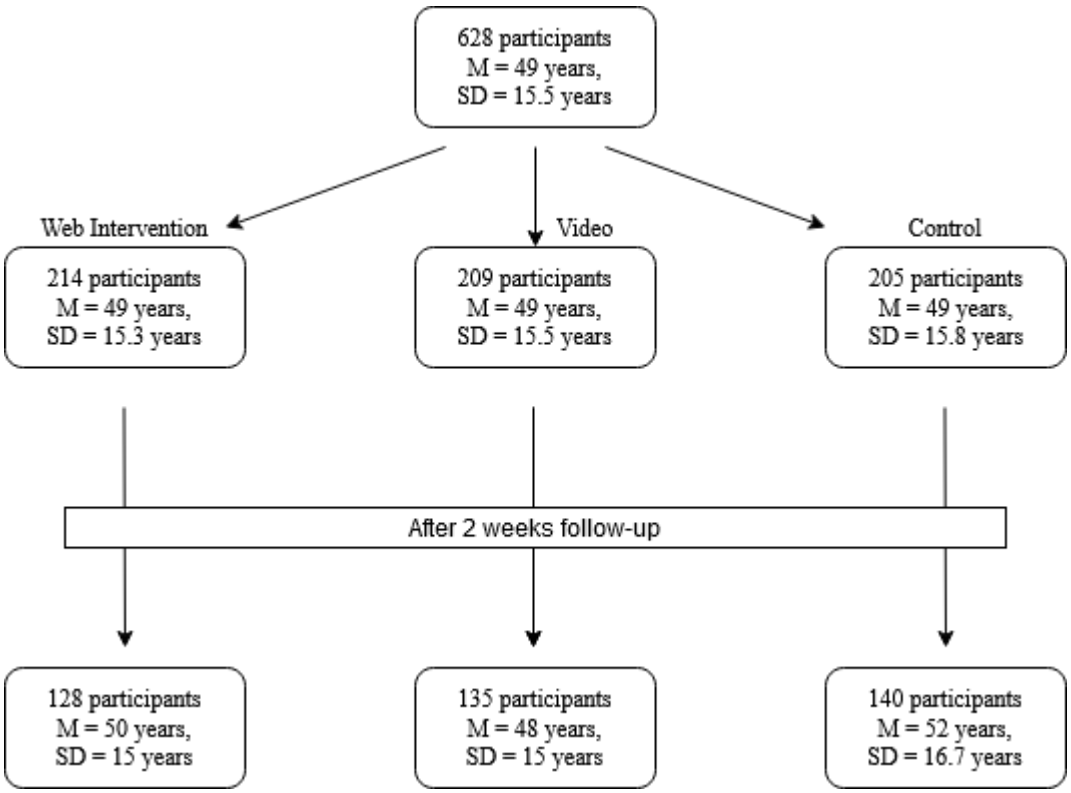

Figure 6.2. A flowchart indicating the number of participants and average age of participants across the three treatment groups at the initial phase of the research and at follow-up.

Measures

Data were collected at three points in time – at pre-intervention, immediately post-intervention, and at a follow-up 2 weeks following completion of the intervention.

Pre-Intervention Measures

These measures were initially administered to the participants before they were exposed to the intervention.

Basic Socio-Demographic Details. Participants were asked relevant, non-identifying questions about age, sex, years of education, and residence location (urban or rural/regional).

Frequency of SPO-Related Consumer Behaviour. Three items on behaviour pertaining to the purchasing of products containing SPO were included ("*At a*

supermarket/food store, how many product labels (ingredients list) have you checked to see if they contain sustainable palm oil?", "*How many products have you intentionally purchased because they contained sustainable palm oil?*", and "*How many products have you avoided purchasing, because you realized that they contained palm oil that is not sustainable?*"). Participants were asked to provide an indication of frequency of each behaviour over the past 12 months, on an 11-point scale, where 0 = "never" and 10 = "10 or more times." These items had an internal consistency of $\alpha = .82$ and were summed to provide a total score that was used for subsequent analysis.

Connectedness with Nature Scale (CNS; Mayer & Frantz, 2004). Connectedness with nature has been shown to be an important predictor of eco-friendly behaviour (Mayer & Frantz, 2004). In this study, the CNS was used to determine if there were any significant difference between the intervention groups at baseline. Fourteen items consisting of statements written in the first person are each rated on a 5-point scale, where 1 = "strongly disagree" and 5 = "strongly agree." Previously, this scale has demonstrated high internal consistency (Cronbach's $\alpha = .84$), high test-retest reliability ($r = .78$, $p < .001$), and concurrent, convergent and discriminant validity (Mayer & Frantz, 2004). In the current study, the scale had high internal consistency (Cronbach's $\alpha = .86$).

Immediate Post-Intervention Measures.

These measures were administered to the participants immediately following exposure to the intervention.

Palm Oil COM-B Survey. This survey was designed for a previous research study that explored barriers and drivers of purchasing products with SPO (Sundaraja, Hine, & Lykins, 2021) based on the Capability-Opportunity-Motivation model of behaviour (Michie et al., 2011). The originally developed survey was retained for the current study and consisted

of 53 items on capability, opportunity, and motivation (Sundaraja, Hine, & Lykins, 2021). All items on knowledge were specific to SPO, while the other items were about "green" or "sustainable" products in general; this decision was made because pilot testing indicated that in the absence of awareness about the palm oil issue and the option of sustainable palm oil, participants would have found it difficult to respond to the survey if all items were SPO-specific (Sundaraja et al., 2021). Items were rated on a 5-point scale of 1 = "not at all like me" to 5 = "just like me." Exploratory factor analysis revealed the same factor structure as in the previous study (Sundaraja et al., 2021), with 6 items for the capability scale of Knowledge/Awareness (α = .90), 4 items for the opportunity scale of Perceived Product Availability (α = .84), and for the two motivation scales – 6 items for Pro-Green Consumer Attitudes (α = .95), and 9 items for Demotivating Beliefs (α = .80).

Intention to Engage in SPO-Related Consumer Behaviour. Participants were asked to indicate how likely they were to engage in the three SPO-related consumer behaviours assessed pre-intervention over the following two weeks (i.e., the interval between intervention participation at first contact and follow-up) on a sliding scale from 0 – 100, where 0 = "definitely will not engage in the behaviour, 50 = "equally likely to engage or not engage in the behaviour" and 100 = "definitely will engage in the behaviour." The items were averaged to provide a measure of the intention to purchase SPO products (α = .82).

Follow-up Measures

At approximately two weeks after having engaged in the intervention, participants were first asked to provide an indication of the frequency of grocery and/or supermarket shopping in the previous two weeks on a 6-point scale from 0 to 5 or more times. Finally, the frequency of engaging SPO consumer behaviour over the interval between intervention participation and follow-up was assessed by administering the same three items that were

administered pre-intervention. These items were summed to provide a total score that was used for data analysis. This total score had a high internal consistency of $\alpha = .87$.

Procedure

All participants were recruited using a Qualtrics™ online panel (Qualtrics, Provo, UT). They were provided with an information sheet prior to providing online consent to participate in the research. All participants also consented to being contacted for a follow-up study. Screening procedures excluded participants below 18 years of age, and those who reported that someone else (i.e., not the participant) primarily did the grocery shopping for the household. Three separate survey links were randomly sent out via email to potential participants, one for each of the intervention groups. All participants initially filled in their socio-demographic details and the frequency of their SPO-related consumer behaviour to obtain a baseline measure of how often they performed the target behaviours around purchasing products containing SPO. They also completed the CNS, after which participants were exposed to their respective interventions: (1) interactive website intervention on palm oil, (2) existing promotional video on sustainable palm oil, or (3) interactive website intervention on differentiating between real news and "fake" news, which was used as the attentional control group.

Interactive Website Intervention on Palm Oil

An interactive website was designed to educate participants about palm oil—its uses and benefits, as well as its impact on the environment, biodiversity, pollution, human health, and social rights (https://unesurveys.au1.qualtrics.com/jfe/form/SV_cJgxqolaE056wdL). Utilising engaging and interactive educational approaches in environmental education has been identified as contributing to effective interventions (Monroe et al., 2019). The concept of SPO was then introduced as a potential solution, along with information on various

behaviour individuals can perform to help promote the use of SPO (Sundaraja, Hine, & Lykins, 2020). These were intended to increase participants' knowledge and awareness about the issue. Further, the narration was from the perspective of a baby orangutan and a tiger cub and aimed to increase green attitudes by encouraging empathy toward the animals in the Southeast Asian rainforests. Finally, participants were presented with the RSPO symbol to help them identify which products had certified SPO in them, which could help them identify SPO products in supermarkets (addressing perceived product availability). The website was "interactive" in that participants were asked to make estimates (e.g., "How many human lives has the Southeast Asian Haze claimed so far via respiratory illnesses?"), drag and drop statements into categories (e.g., "Advantages of palm oil," "Disadvantages of palm oil," or "Not relevant to the issue"), and select areas on an image where consumers can have an impact in the palm oil supply chain. The interaction element was included so that the participants were actively engaging with the content provided and thus were not mere passive recipients of this information.

Video on Sustainable Palm Oil

The second group was exposed to an existing promotional video (https://youtu.be/K6KOQjimVjA) titled "Sustainable Palm Oil Challenge – Supply and Demand", created by Chester Zoos (2019) to encourage people to purchase products containing SPO. The video (3 minutes 14 seconds) aims to raise awareness about the palm oil issue and supply chain, while encouraging viewers to read labels and use their consumer power to support SPO (Chester Zoos, 2019). The collected survey data included information on how long the participants stayed on this page after clicking "play" to watch the video. A page timer was incorporated to prevent participants from moving to the next page until 194 seconds (the duration of the video) had elapsed. Additionally, participants were asked three simple true or false questions about content in the video to ascertain if they were paying

attention (e.g., *Palm oil has an impact on crocodiles.*), and had to respond correctly to at least two out of the three to be included in the sample. This resulted in 11 participants being excluded.

Interactive Website on Real News and Fake News

For the attentional control group, an interactive website was created to teach participants how to differentiate between real news and fake news, as narrated by "Bottie" the robot (https://unesurveys.au1.qualtrics.com/jfe/form/SV_6FLs3j529k19WPH). Participants in this group were first helped to identify titles that indicated fake news, and to evaluate if the news sources they relied on use evidence-based reporting. Brief articles were provided, and participants had to read each one and indicate if it was real news or fake news. The respondents exposed to this intervention served as the attentional control group, as they were exposed to an interactive website and obtained information in an engaging manner but received no information about palm oil nor its availability, and green attitudes were not targeted.

Immediately post-intervention, all participants completed the Palm Oil-Related COM-B survey (with items presented in a randomized order) and provided indications of their likelihood of engaging in SPO-related purchasing behaviour over both the following two weeks and 12 months. Participants were also given an opportunity to download two shopping resources that would help them identify products with SPO. One was a list of brand names that source SPO (*Brand leaders for sustainable palm oil*, 2019), and the other was an Australian shopping guide to products that are either palm oil-free or use certified SPO (BOS Australia, n.d.).

Apart from the screening of age and being the primary grocery shopper for the household, participants were required to pass two attention-checks incorporated into the

COM-B survey. These were instructed-response items (e.g., “In order to check for attention, please answer ‘3’ for this question”), which have been known to be useful in screening out careless responders while still protecting the validity of the scale (Kung et al., 2018; Meade & Craig, 2012). Failing an attention-check immediately resulted in participants being taken to the end of the survey, resulting in an incomplete response. Across all the three survey links, respondents who provided partial responses were automatically screened out. Additionally, participants whose response times were below one-half of the average time taken for each of the three groups (less than or equal to 7 minutes 30 seconds, 7 minutes, and 6 minutes 30 seconds respectively for Groups One, Two and Three) were automatically screened out to ensure good data quality. Three participants were screened out this way (two from Group One and one from Group Three). After the 11 participants screened out of Group Two were excluded for failing the fact-checking true or false questions, no additional participants were screened out based on a below average time taken to complete the survey.

Two weeks after the initial survey launch, all participants were emailed with a request to complete a brief follow-up survey. Participants who clicked on the survey link were taken to another information sheet, after which they again provided consent to participate in the follow-up survey. After the follow-up measures were administered, participants were offered a chance to sign a petition requesting their respective state ministers in Australia to ensure that all palm oil on products is labelled – sustainable or otherwise (https://www.zoo.org.au/dont-palm-us-off/).

Data Analysis

Multiple analyses of variance (ANOVA), and chi-square analyses were run using IBM SPSS Statistics version 26 (IBM corp., Armonk, NY, USA). Mediation analysis was run

using the SPSS PROCESS (version 3.5) macro (Hayes, 2014). Latent profile analysis (LPA) was performed using MPlus Version 8.4 (Muthén & Muthén, 2019).

Ethics

The study was approved by the Human Research Ethics Committee of the University of New England, Australia (Approval No. HE20-107) and was conducted in compliance with the recommended research ethics procedure.

Results

The main aims of the study were to (1) evaluate the impact of an interactive website intervention (relative to a video intervention and an attentional control) on consumer SPO purchasing intentions and behaviour, and (2) determine whether these effects were mediated by COM-B factors of knowledge/awareness, perceived product availability, and pro-green consumer attitudes. At pre-intervention, 52.7% of the total sample across the three intervention groups (SPO website, video, and control) reported never engaging in SPO purchasing behaviour during the past 12 months. Overall, the total sample had a mean level of nature-connectedness that fell just above the mid-point on the 5-point scale (M = 3.45, SD = .61). The three treatment groups did not differ significantly on nature-connectedness [$F(2, 625) = 2.02$, $p = .13$, partial $\eta^2 = .01$] nor their past SPO-purchasing behaviour [$F(2, 625) = 2.33$, $p = .10$, partial $\eta^2 = .01$], indicating that random assignment was effective in distributing pre-existing participant attributes evenly across treatment groups. Thus, we did not control for these factors in subsequent analyses. At follow-up, participants indicated that they visited their grocery store or supermarket an average of three times during the two-week interval.

Outcome Measures

A MANOVA was conducted to determine if there was a statistically significant difference between the website, video and control groups on immediate post-intervention measures (i.e., the four COM-B factors and the intention to engage in SPO purchasing behaviour over the subsequent two weeks following the exposure to the intervention; N = 682), and the follow-up measure of SPO consumer behaviour (n = 403). Preliminary analysis revealed that Knowledge/Awareness and follow-up SPO Consumer Behaviour exhibited heterogeneity of variance across experimental conditions. Therefore, bootstrapping for 5000 samples was run to compute standard errors and probability values for these analyses and associated post-hoc tests. Statistically significant effects of group membership were found with knowledge/awareness, SPO purchasing intention and SPO consumer behaviour at follow-up. A summary of analyses with post-hoc tests, for each dependent variable is presented in Table 6.1.

Table 6.1

MANOVA and post-hoc tests for outcome measures by intervention group

	F	**Partial η^2**	**Intervention Group**		
			Interactive Website	**Video**	**Control**
Pro-Green Consumer Attitudes	0.23	0.00	3.49[a]	3.44[a]	3.44[a]
Demotivating Beliefs	0.02	0.00	2.75[a]	2.75[a]	2.76[a]
Perceived Product Availability	2.54	0.01	2.56[a]	2.56[a]	2.73[a]
Knowledge/ Awareness[#]	4.17**	0.03	3.23[a]	3.01[a/b]	2.80[b]
SPO Purchasing Intentions	5.21**	0.02	61.75[a]	61.04[a]	54.55[b]

SPO Consumer Behaviour (Follow-Up) [#]	3.02*	0.02	2.74[a]	2.96[a]	4.37[a]

*$p \leq .05$; ** $p < .01$; [#] Bootstrapped with 5000 samples; Means with different superscripts are significantly different at $p < .05$, while means with the same alphabet superscript indicates no statistically significant difference between means; [a/b] There is no statistically significant difference with the website intervention group, nor the control group.

The website intervention significantly increased knowledge/awareness and SPO purchasing intentions relative to the attention control group, but not relative to the video group. SPO Consumer Behaviour at follow-up showed a trend of the control group reporting having engaged in more SPO consumer behaviour than the website intervention group (mean difference = -1.63, $p = .07$; 5000 bootstrap samples 95% CI [-3.13, -.08]). This was an unexpected finding and was explored further using other analyses.

Chi-square tests of independence were also performed to examine the effect between the intervention group membership on participants' decisions to download the SPO shopping resources provided in the survey and/or follow a link to an Australia petition supporting improved palm oil labelling. The effects of the interventions on downloading SPO shopping resources ($\chi^2(2, N = 628) = 1.65$, $p = .22$, $\varphi = .05$) and visiting the petition webpage ($\chi^2(2, N = 403) = .98$, $p = .61$, $\varphi = .07$) both did not approach significance.

Mediation Analysis

Mediation analyses were run to help understand the relationship between the intervention groups on SPO purchasing intentions, as well as SPO consumer behaviour at follow-up, and to see if this is mediated by the four COM-B factors of knowledge/awareness, perceived product availability, pro-green consumer attitudes and demotivating beliefs. Figures 6.3 and 6.4 depict the pathways that were tested, with unbroken lines indicating those which were significant. All indirect effects were computed using 5000 bootstrapped samples.

Overall, the variables in Model 1 (Figure 6.3) together accounted for 49% of variability in SPO purchasing intentions, F (6, 621) = 100.99, $p < .001$, $R^2 = .49$. The website intervention influenced SPO purchase intentions via the mediator knowledge/awareness (indirect effect = 2.49, $p < .001$, 95% CI [1.17, 4.10]), as did the video intervention (indirect effect = 1.22, $p < .001$, 95% CI [.01, 2.64]), but not via the other mediators. Perceived product availability was the only mediator that did not significantly predict SPO purchasing intentions. After controlling for the mediating variables, direct effects of both web and video interventions on intentions remained statistically significant, indicating the effects were only partially mediated by the COM variables included in our study.

With respect to Model 2 (Figure 6.4), all the tested variables together accounted for 17% of variability in SPO consumer behaviour at follow-up, F (6, 396) = 13.58, $p < .001$, $R^2 = .17$. The website intervention exerted a negative impact on consumer behaviour by decreasing perceived product availability (indirect effect = -.51, $p < .001$, 95% CI [-1.04, -.05]). A similar pattern was evident for the video intervention (indirect effect = -.28, $p < .001$, 95% CI [-1.04, -.05]). Therefore, while both the website and video interventions induced stronger SPO purchasing intentions by increasing knowledge/awareness, these interventions also weakened perceived product availability, a potentially important determinant of actual SPO consumer behaviour.

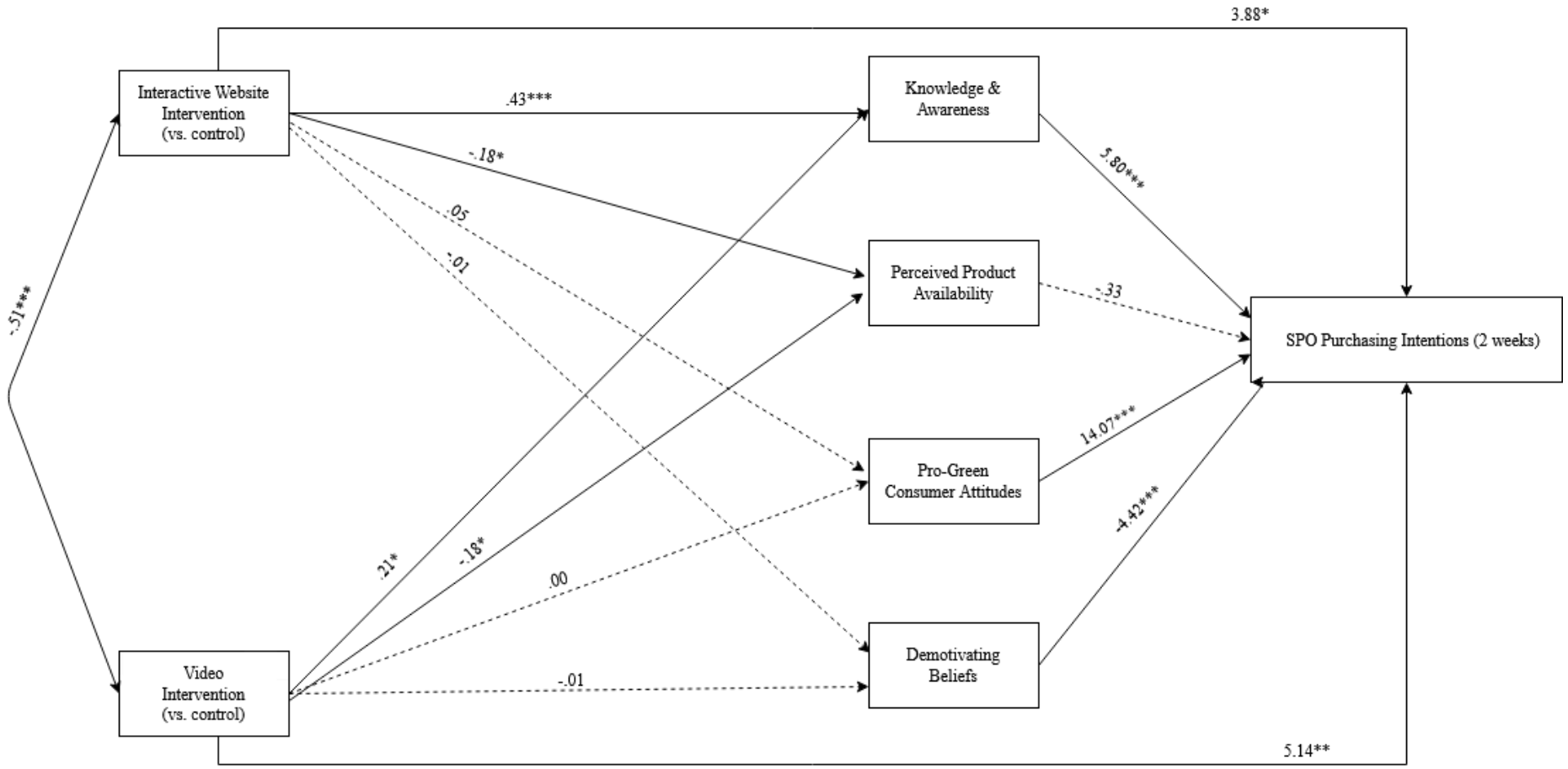

Figure 6.3. Model 1. COM-B as potential mediators of the relationship between the intervention groups and SPO purchasing intentions. The model indicates that the relationship between the website intervention and SPO purchasing intentions is partially mediated by knowledge/awareness. All reported path coefficients are unstandardised; *$p < .05$, **$p < .01$, ***$p < .001$.

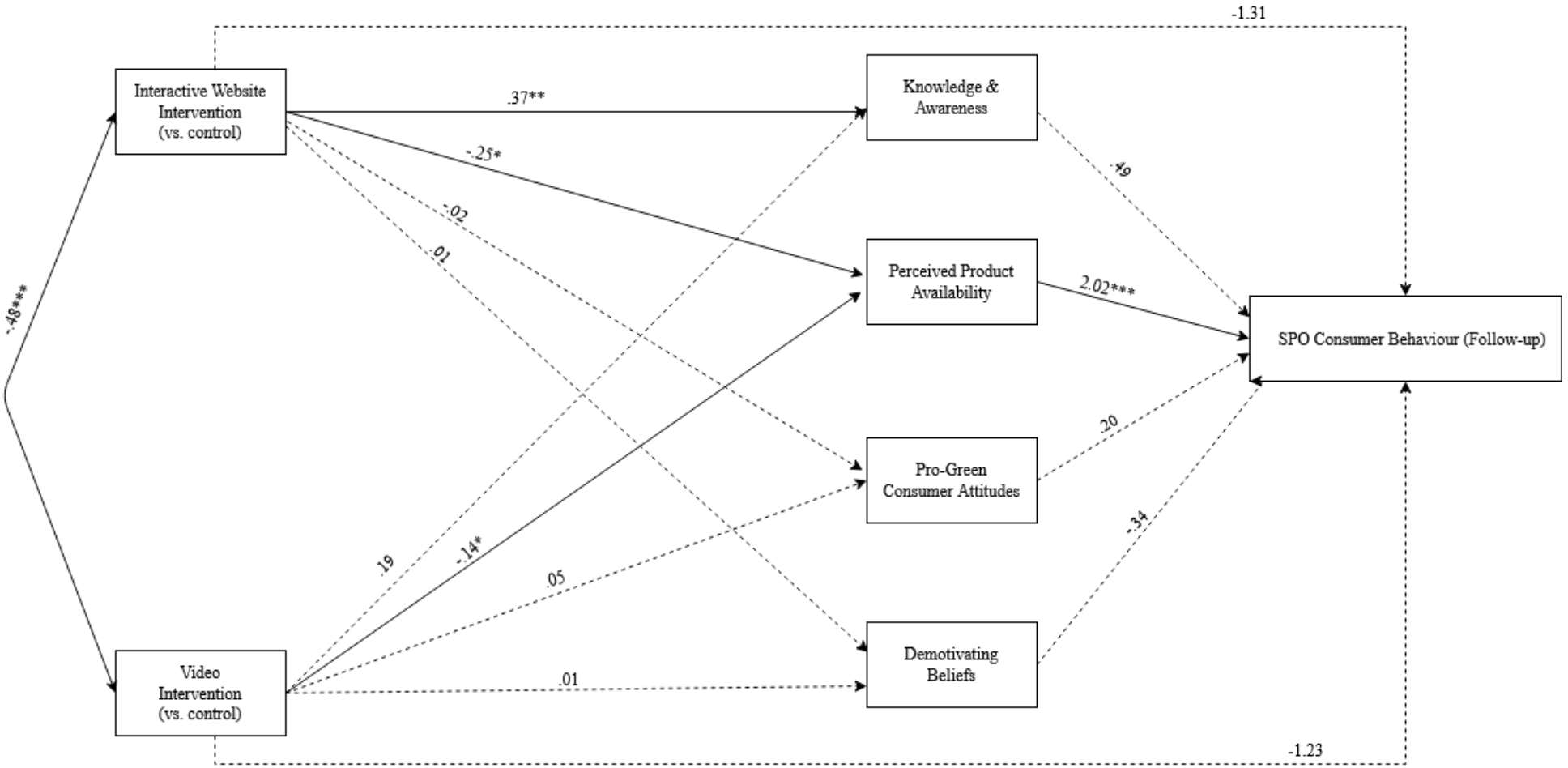

Figure 6.4. Model 2. COM-B as potential mediators of the relationship between the intervention groups and SPO consumer behaviour at follow-up. The model indicates that the relationship between the website intervention and SPO consumer behaviour is mediated by perceived product availability. All reported path coefficients are unstandardised; **p* < .05, ***p* < .01, ****p* < .001.

Latent Profile Analysis and Subsequent Analyses

The results thus far indicated that the interactive website and video SPO interventions significantly increased SPO purchasing intentions, but also might have reduced SPO purchasing behaviour. The mediation analysis suggested that this discrepancy could be because the interventions decreased perceived product availability. To further understand the SPO-purchasing intention-behaviour gap observed in the study, a latent profile analysis (LPA) on SPO purchasing intentions (assessed immediately following the interventions) and SPO consumer behaviour (assessed two weeks following the intervention) was conducted. The LPA enabled us to identify groups of participants with distinct intention-behaviour profiles and determine what factors internal and/or external to the participants may be critical for translating environmentally responsible purchasing intentions into pro-environmental behaviour. Using the Bayesian information criteria (BIC; Schwarz, 1978), relative entropy (Ramaswamy et al., 1993) and the Lo-Mendell-Rubin likelihood ratio test (LMR; Lo et al., 2001), the relative model fit was assessed for two-, three-, four-, five- and six-profile solutions (Table 6.2).

Table 6.2

Model fit indices for two-, three-and four profile solutions

Profile solution	BIC	Entropy	LMR (p-value)
2	6115.62	.95	.003
3	5927.32	.97	.001
4	5883.80	.91	<.001
5	5778.49	.91	.001
6	5754.94	.91	.386

Note. BIC = Bayesian information criterion, LMR = Lo-Mendell-Rubin likelihood ratio test.

Entropy values that approach 1 indicate a clear delineation of profiles (Celeux & Soromenho, 1996), and a significant LMR test indicates that a given profile solution fits the

data significantly better than the solution with one fewer profile group. While almost all the profiles had entropy values nearing one and significant LMRs, the four-profile solution was the most interpretable as low intentions-low behaviour (Disengaged, $n = 61$), high intentions-low behaviour (Dissonant, $n = 251$), high intentions-moderate behaviour (Moderately Engaged, $n = 68$), and intentions-high behaviour (Highly Engaged, $n = 23$).

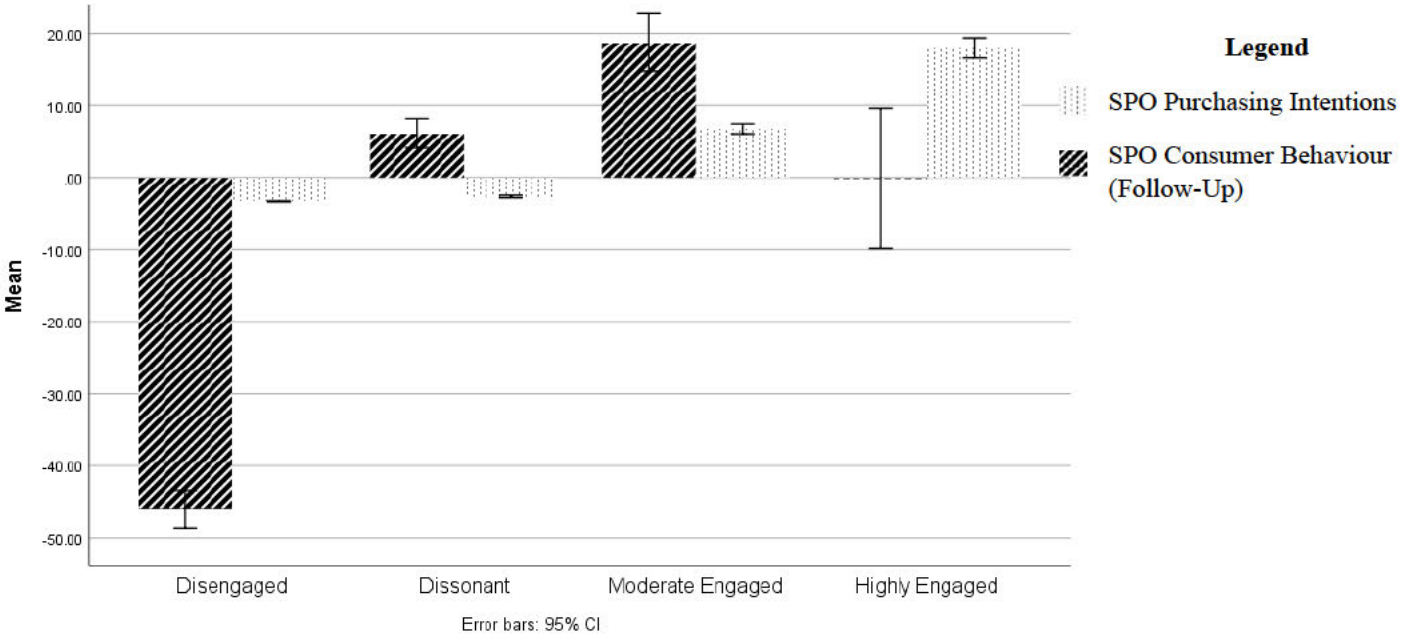

Figure 6.5. Mean standard scores across SPO purchasing intentions and SPO consumer behaviour at follow-up, depicting the four-profile solution of the LPA.

A chi-square tests of independence performed indicated that there was no significant relationship between the intervention groups and the LPA profiles ($\chi^2(6, N = 403) = 8.82$, $p < .18$, $\varphi = .13$). Therefore, similar proportions of disengaged, dissonant, moderately engaged and highly engaged participants were found across all groups (website intervention, video, and control).

Using the profile membership data, a series of ANOVAs were run on participants who had completed measures at the initial contact and follow-up ($n = 403$), bootstrapping to 5000

samples and 95% confidence, as the sample sizes are unequal across the four groups. Table 6.3 contains the results from post-hoc analysis.

Table 6.3

ANOVA results and summary of Tukey's HSD post-hoc tests comparing continuous pre-intervention measures and all outcome measures amongst the profiles of disengaged, dissonant, moderately engaged and highly engaged

	F	Partial η^2	Profiles Based on Intention-Behaviour			
			Disengaged	Dissonant	Moderately Engaged	Highly Engaged
Age	8.17*	.06	50.56[a]	50.65[a]	43.74[b]	38.39[b]
Years of Education	.47	.00	14.72[a]	14.69[a]	15.14[a]	15.09[a]
Past SPO Consumer Behaviour (pre-intervention)	75.22*	.36	.74[a]	3.26[a]	11.74[b]	16.13[c]
Nature Connectedness	20.22*	.13	2.93[a]	3.45[b]	3.65[b]	3.70[b]
Pro-Green Consumer Attitudes	51.33*	.28	2.41[a]	3.49[b]	3.88[c]	3.83[b/c]
Demotivating Beliefs	9.00*	.06	3.10[a]	2.77[b]	2.55[b]	2.45[b]
Perceived Product Availability	38.89*	.23	1.88[a]	2.51[b]	3.25[c]	3.40[c]
Knowledge/ Awareness	37.12*	.22	1.87[a]	3.04[b]	3.44[c]	3.53[b/c]
Intention to Purchase SPO Products [#]	209.69*	.61	10.95[a]	63.11[b]	75.73[c]	56.84[b]
SPO Consumer Behaviour (Follow-Up) [#]	1288.06*	.91	.03[a]	.72[a]	10.15[b]	21.35[c]

*$p < .001$; [#] These variables were included in the LPA; Means with different superscripts are significantly different at $p \leq .01$, while means with the same alphabet superscript indicates no statistically significant difference between means; [b/c] There is no statistically significant difference with the dissonant, nor the moderately engaged.

The engaged participants tended to be younger in age, and those who were disengaged significantly differed from all other profiles on nature-connectedness and the four COM-B factors. The dissonant group significantly differed from both the highly engaged group and the moderately engaged group on perceived product availability, while significantly differing from only the moderately engaged group on pro-green consumer attitudes and knowledge/awareness. The highly and moderately engaged groups show non-significant differences across all tested variables, except with the pre-intervention measure of SPO consumer behaviour over the 12 months prior to the research participation, indicating that past behaviour is a strong predictor of future SPO consumer behaviour.

Overall, the results indicate a partial fulfilment of the hypothesis that the website intervention would address COM-B factors of knowledge/awareness, perceived product availability and pro-green consumer attitudes, that would in turn lead to increased SPO consumer behaviour. Instead, it was found that the interactive website intervention did influence SPO purchasing intentions via increasing knowledge/awareness, but also reduced perceived product availability, the strongest predictor of actual purchasing behaviour. Finally, when participants were categorized as being disengaged, dissonant, moderately engaged and highly engaged based on SPO purchasing intentions and SPO consumer behaviour at follow-up, the only difference between the dissonant and both engaged groups was again reduced perceived product availability in the former. Finally, knowledge/awareness and pro-green consumer attitudes were important to distinguish between the dissonant and moderately engaged groups.

Discussion

An interactive website intervention was designed to increase consumers' engagement in SPO purchasing behaviour, by increasing their knowledge/awareness, perceived product

availability and pro-green consumer attitudes. The results revealed that the website intervention did significantly increase participants' knowledge/awareness about the palm oil issue, as well as SPO purchasing intentions. However, it did not have an impact on pro-green consumer attitudes and might have inadvertently reduced perceived product availability, which was a significant predictor of SPO consumer behaviour at follow-up. Further, the control group showed a trend towards engaging in more SPO consumer behaviour than both intervention groups (website and video).

While increasing knowledge and awareness is an essential first step in the promotion of PEB and green consumerism (Hines et al., 1987; Hungerford & Volk, 1990; Joshi & Rahman, 2015), the present study concurs that educational interventions alone are insufficient to promote consumer action, particularly in the face of external barriers surrounding opportunities and availability (Steg & Vlek, 2009). With respect to palm oil, there are several significant obstacles, including extensive research required on which products contain SPO prior to supermarket shopping, as well as unclear and obscure product labels making it difficult to identify SPO-containing products (Isenhour, 2014; Sundaraja, Hine, Alex, et al., 2020). Education alone is unlikely to assist consumers in overcoming these barriers.

Along with knowledge and awareness, pro-green consumer attitudes differentiated between those who were dissonant (had a large intention-behaviour gap), and those who moderately engaged in SPO consumer behaviour. However, pro-green consumer attitudes were not significantly increased by the interventions, and nor did it significantly mediate the relationship between the interventions and outcome measures. Previous research on PEB and food consumption has indicated that interventions targeting motivation-related factors were less effective when compared to manipulating capability and opportunity-related factors (Hanss & Böhm, 2013; Hartmann-Boyce et al., 2018; Pearson et al., 2011; Vermeir & Verbeke, 2006).

Perceived product availability was targeted by specifically providing information on the alternative of SPO, and then additionally making available a shopping guide, along with a list of brands one could purchase from. However, palm oil (sustainable or otherwise) is often a hidden ingredient, frequently listed as an obscure "vegetable oil," or several technical terms (of which there are more than 200; Orangutan Foundation, 2019) that are unlikely to be recognized by the average consumer. Additionally, the use of small letters on labels, a sustainability logo that is not well-recognized (Sundaraja, Hine, Alex, et al., 2020), and manufacturers refraining from mentioning palm oil on the label due to the negative public perceptions surrounding it (Bicknell et al., 2018; Hinkes & Christoph-Schulz, 2019) all reduce the perceived availability of SPO products.

Both the interactive website and promotional video, while increased SPO purchasing intentions, did not produce significant behaviour change. The intention-behaviour gap in the context of green consumption has been previously studied (Barbarossa & Pastore, 2015; Carrington et al., 2010, 2014) and in the present study, perceived product availability was highlighted as a factor that was not necessary for SPO purchasing intentions, but important in predicting actual SPO consumer behaviour. Perceived product availability reflects "opportunity" in the COM-B model and is the only factor to significantly distinguish between those who were moderately and highly engaged in SPO consumer behaviour and those who were dissonant (i.e., expressed high intentions, but did not engage in the corresponding behaviour). Further, the control group appeared to trend towards greater perceived product availability and increased follow-up SPO consumer behaviour, which is surprising. As the issue of palm oil is complex (Isenhour, 2014; Wright et al., 2019), it is possible that knowledge on the multifaced nature of this problem, and the lack of a perfect solution presented by the intervention groups might have highlighted the difficulties in making the right consumer decision. Further, in the control group, completing the Palm Oil COM-B

survey, might have drawn participants attention to the oil palm issue, but in the absence of detailed information, participants might not have perceived difficulty in finding these SPO products. Future research needs to explore whether subtle informational strategies, as versus more direct ones might better impact pro-environmental behaviour.

It is hoped that these findings will strengthen the argument that the heavy responsibility of engaging in PEB, and thereby tackling larger issues like climate change that is being placed exclusively on individuals or consumers (Moisander, 2007), essentially ignores those factors that may be beyond a person's control (Isenhour, 2014; Räthzel & Uzzell, 2019). Interventions can potentially influence PEB and green consumerism if they are able to address barriers related to capability and opportunity, which could require environmental restructuring and policy changes in order to be effective (Michie et al., 2011). It would appear that structural changes or strategies (Steg & Vlek, 2009)—for example, having a "pro-environmental" or "sustainable" aisle in the supermarket—are a necessary adjunct to educational interventions. Some informational strategies like the development of a barcode-scanning mobile applications (https://www.sustainabilityhackers.com/sustainable-food-apps/) that detect the presence of palm oil (sustainable or otherwise) might additionally support consumers. Therefore, the current research adds to the literature advocating for additional government support and policy-level changes that would make this consumer behaviour easier—for example, having a national procurement policy in place that ensures the import of palm oil that is sustainable, and ensuring visible, legible, and explicit product labels (Isenhour, 2014; Sundaraja et al., 2020) without which it may not be possible to influence global markets.

Implications

The current study is unique in that it is among the first to utilise the COM-B model in the field of green consumerism, to increase the sustainable purchasing of palm oil. Further, this research does not attempt to target motivation in isolation but situates it alongside factors of the capability (possessing relevant and accurate information) and opportunity (perceived availability of products where people generally shop). Therefore, it highlights the importance of not solely focusing on individual motivation when it comes to increasing green consumerism, but to have a thorough understanding of factors outside an individual's control (relating to opportunity) that can serve as important barriers to the desired behaviour (Isenhour, 2010, 2014; Räthzel & Uzzell, 2019). It also postulates that providing consumers with a large amount of information may be counter-productive in promoting green consumption and other pro-environmental behaviour. Moreover, this research highlights the importance of considering structural interventional strategies that target barriers around opportunity and lends empirical support to previous studies that have advocated for policy-level changes around procurement and labelling to increase the global demand for and purchasing of SPO (Isenhour, 2014; Sundaraja et al., 2020).

Limitations

It is important to acknowledge that this intervention was conducted in June 2020, in the midst of the COVID-19 pandemic, which has drastically impacted grocery shopping behaviour (Grashuis et al., 2020; Reiley, 2020). People were more likely to shop online (where reading labels can be harder), or if they were shopping in person, did so quickly and with haste to minimise exposure to crowded places (Reiley, 2020). Given these circumstances, it is possible that carefully checking labels and looking for SPO products was low on people's list of priorities. Further, there appears to be a dwindling of enthusiasm for sustainable products and a tendency to buy familiar brands when shopping online (Reiley,

2020). It would be interesting to conduct this study once again in a non-pandemic era and see if the results are any different, particularly with respect to perceived product availability and SPO-related consumer behaviour.

Conclusions

In conclusion, this research tested an interactive website intervention aimed at increasing SPO consumer behaviour and concluded that while the intervention increased participants' knowledge about palm oil and boosted intentions to purchase SPO products, it had no impact on actual follow-up consumer behaviour. Perceived product availability (which is an opportunity-related factor) was lower in the intervention groups, and was an important predictor of the outcome behaviour, as well as distinguished between those who merely expressed intentions to purchase SPO, and those who actually demonstrated greater SPO consumer behaviour. As such, these findings highlight the importance of opportunity-related factors in promoting green consumption. Often, addressing these factors would require environmental restructuring by policy-level changes that make the desired behaviour easier to perform. Future research could look at simulated experiments, where in addition to providing varying degrees of education, the environment can be restructured to test the importance of facilitating availability of sustainable products in contributing to behaviour change.

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STATEMENT OF ORIGINALITY

(To appear at the end of each thesis chapter submitted as an article/paper)

We, the Research Master/PhD candidate and the candidate's Principal Supervisor, certifythat the following text, figures and diagrams are the candidate's original work.

Type of work	Page number/s
Text (inclusive of tables)	171 – 207

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Higher Degree Research Thesis by Publication

University of New England

STATEMENT OF AUTHORS' CONTRIBUTION

(To appear at the end of each thesis chapter submitted as an article/paper)

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CHAPTER SEVEN

General Discussion and Conclusions

Across the world, there is an increasing demand for edible oils, linked to growing consumerism and changing lifestyles associated with rising per capita incomes (Meijaard et al., 2018; OECD & FAO, 2018). Palm oil is one such oil, having soared to popularity because of its high yield, relative inexpensiveness and versatility (Meijaard et al., 2018). Grown primarily in tropical Southeast Asia, the expansion of oil palm plantations has assisted local communities and is a major source of income for rural farmers (Lee et al., 2013; Meijaard et al., 2018). However, this boom in developing economies is associated with widespread deforestation, peat degradation, species extinction, greenhouse gas emissions, pollution, and other significant social issues (Gilbert, 2012; Koh & Wilcove, 2008; Koh & Wilcove, 2009; Meijaard & Sheil, 2013; Sheil et al., 2009; World Bank, 2018). Tropical rainforest loss in Southeast Asia has been directly linked to global climate change via increasing greenhouse gas emissions, disrupted rainfall patterns and rising surface temperatures, both locally and globally (Pearce, 2018; Wolosin & Harris, 2018).

A technological solution of creating synthetic oil replacements is some time away (Parsons et al., 2020), and there are risks involved in a blanket boycott of palm oil, which include displacing the deforestation (Meijaard et al., 2018; Wilcove & Koh, 2010) and disadvantaging rural communities (Meijaard et al., 2018; Sheil et al., 2009). Further, there are very few studies that explore the complexity of the palm oil crisis or have provided any information about how human behaviour can be modified to address it, within the field of environmental psychology.

It was important to first identify which specific pro-environmental behaviours (PEBs) or actions would have the highest impact in working to resolve this crisis. Next, before attempting to increase that specific palm oil-related PEB, it was essential to recognise

specific situational barriers that may decrease its frequency, as well as understand certain internal variables that may need to be influenced in order to secure long-lasting behaviour change (Stern, 1999). Finally, this information could be used to create a behaviour change intervention designed to enhance the selected target behaviour.

Addressing the Aims of the Thesis

Selecting a Target Behaviour

Studies 1 and 2 aimed to first generate a list of palm oil-related PEB that the general community in Australia can engage in, followed by identifying a target behaviour out of this list, which would potentially have the greatest influence on reducing the palm oil crisis, respectively. This was done based on step 1 of the principles of Community-Based Social Marketing (CBSM; McKenzie-Mohr, 2011). The former was obtained by interviewing twelve experts in the field (conservation scientists, environmental journalists, and activists). The latter was addressed by creating a behaviour prioritization matrix of: (1) effectiveness of each potential PEB identified by the experts; (2) the probability of adoption by community members; and (3) the existing penetration, that is the frequency with which people already engage in the behaviour (McKenzie-Mohr, 2011). In this way, eleven potential palm oil-related PEBs were identified, out of which "purchasing products containing only sustainable palm oil (SPO)" received the highest weighted impact score (a product of effectiveness, probability and inversed penetration).

All experts agreed that the issues around palm oil were shroud with complexity (Isenhour, 2014; Wright et al., 2019). The interviews also confirmed that banning palm oil products was not an optimal or desirable solution, and that a more promising solution would be to encourage sustainability, which is consistent with earlier findings (Lyons-White & Knight, 2018; Meijaard et al., 2018; Wilcove & Koh, 2010). The Roundtable on Sustainable

Palm Oil (RSPO), the non-governmental organisation that has taken the lead in setting certification standards for sustainable palm oil (SPO), has been accused of greenwashing (Environmental Investigation Agency & Grassroots, 2019; Lang, 2015; Rahmawati, 2014) and is yet to provide hard evidence of reducing the environmental destruction related to palm oil (Carlson et al., 2018; Morgans et al., 2018). However, other existing certification standards in palm oil such as the Indonesian Sustainable Palm Oil (ISPO) and the Malaysian Sustainable Palm Oil (MSPO) have been deemed to be less stringent and credible in terms of environmental protection (Hidayat et al., 2018; Schouten & Bitzer, 2015), leading some experts to suggest that supporting the RSPO may be the best way forward. Further, the RSPO has expressed its openness to receiving constructive feedback to improve certification validity (Schouten & Glasbergen, 2011, 2012) and it is believed that a stricter enforcement of the certification criteria might encourage the industry to evolve more sustainably into the future (Lyons-White & Knight, 2018).

Utilizing the behaviour prioritization matrix (McKenzie-Mohr, 2011), consumer action by increasing the pressure on manufacturers and retailers to source only SPO was rated by experts as being the most effective behaviour. However, the community participants surveyed indicated that they were least likely to adopt this behaviour. This specific PEB can be viewed as 'difficult but effective' (high effectiveness but low probability; Kneebone et al., 2017), and it is not recommended that such behaviour be targeted initially (McKenzie-Mohr, 2011). Instead, promoting 'catalytic' or 'wedge' PEBs that are simple and relatively easy (e.g., environmentally-friendly purchasing behaviour), have a higher likelihood of being adopted and can therefore precede more effective and potentially difficult steps (Thøgersen & Noblet, 2012).

Purchasing products containing only SPO is a consumer behaviour that was deemed to have the highest potential impact on reducing the ecological degradation associated with

unsustainable palm oil production, taking into consideration effectiveness, probability and penetration. Currently, the global demand for certified SPO is less than the supply (Lyons-White & Knight, 2018), which is a problem as there are fewer incentives for manufacturers to make the shift to SPO. It is believed that consumers can make a significant impact by driving the demand for SPO (Lyons-White & Knight, 2018; Schouten & Glasbergen, 2012).

Identifying Barriers and Drivers to Purchasing Products Containing SPO

Once a target behaviour was selected, step 2 of CBSM involved identifying barriers and drivers to performing this behaviour (McKenzie-Mohr, 2011). Using the Behaviour Change Wheel as a guiding framework, Study 3 aimed to identify factors of capability, opportunity and motivation (COM-B; Michie et al., 2011) that could influence Australian consumers' decision making around products that contain SPO. Interviews were conducted with thirteen participants who self-reported either purchasing SPO products, boycotting palm oil entirely, or being unaware of the palm oil issue. Important factors across the COM-B factors were highlighted, including knowledge about the issue, potentially higher costs associated with SPO products, limited resources of time and energy, unclear or deceptive labelling, lack of ready availability and/or ease of access, social norms, perceived consumer efficacy, emotions like guilt or pride, empathy, and compassion towards nature and/or endangered species, habitual purchases, and personal values, all of which potentially interact with each other.

Building on this, Study 4 was one of the first to adopt a systemic COM-B framework to quantitatively identify barriers which impede SPO consumption, accomplished by surveying a large group of 781 Australian participants. This tied into step 3 of CBSM, which links the identified barriers and/or drivers of the target PEB to interventional strategies. The results revealed that a lack of knowledge and awareness about the issue, reduced perceived

product availability, and fewer pro-green consumption attitudes best predicted engagement in SPO purchasing behaviour, which directly mirror capability, opportunity, and motivation respectively.

The primary psychological capability identified as essential for SPO-related behaviour change was knowledge about the issue and what can be done about it. The importance of knowledge and awareness has been supported by previous research (Hines et al., 1987; Hungerford & Volk, 1990; Joshi & Rahman, 2015; Lange & Coremans, 2020). However, when compared to other PEB like recycling or energy conversation which are relatively well-known, individuals may lack specific knowledge about how their consumer choices impact the environment (Lange & Coremans, 2020). Although prior research has indicated that the more knowledge consumers had about palm oil and its environmental impacts, the greater the intentions to change their consumption habits (Lange & Coremans, 2020), palm oil is a very complex issue, and so attaining this knowledge on palm oil in general and SPO in particular, can be quite difficult and particularly time-consuming (Isenhour, 2014). Further, there are conflicting messages on either purchasing SPO (Parsons et al., 2020; Wilcove & Koh, 2010) or boycotting palm oil altogether (advocated by some non-governmental organisations), which confuse consumers as to which source of information and advice is trustworthy (D'Antone & Spencer, 2015; Isenhour, 2014).

In the interviews, although affordability was a physical capability factor that was frequently mentioned, it did not emerge as a key predictor of SPO purchasing behaviour. While product price is an important factor in promoting sustainable consumption (Barbarossa & Pastore, 2015; Joshi & Rahman, 2015), consumers who purchased SPO did not report a significant cost difference between SPO and its non-sustainable counterpart.

With respect to the factor of opportunity, the perceived ease of availability of sustainable or green products is important in facilitating green consumerism (Barbarossa & Pastore, 2015; De Pelsmacker et al., 2005; Joshi & Rahman, 2015; Young et al., 2010). The interviewed participants reported that there were only few SPO options where they generally shop (and most had not noticed if products containing SPO were even present). Closely linked with product availability is visibility in places of shopping and clear labelling. Palm oil is often a hidden ingredient in food products, as regulations in Australia do not mandate that it be labelled as such (FSANZ, 2017). Often palm oil is subsumed under a generic "vegetable oil," or several technical terms (of which there are more than 200; Orangutan Foundation, 2019) that are unlikely to be recognized by the average consumer. Some manufacturers deliberately do not label palm oil on their products due to the negative public perceptions surrounding it (Bicknell et al., 2018; Hinkes & Christoph-Schulz, 2019), while others use small letters or a sustainability logo that is not recognized. Research has indicated that ecolabels, such as the RSPO certified SPO label, are rarely recognized (Ostfeld et al., 2019). All these reasons can lead consumers to find it difficult to distinguish between companies that adopt sustainable or unethical/unsustainable practices (Carrigan & Attalla, 2001), and struggle to locate and source products containing SPO. This could lead consumers to perceive SPO products as less readily available even in circumstances where they are available for purchase.

In Study 4, the term "pro-green consumption attitudes" subsumes feelings of environmental concern, empathy, responsibility, guilt, and perceived consumer efficacy, as well as pride and satisfaction at having performed consumer-related PEBs. All these are motivation-related elements that have been supported by literature on green consumer behaviour (Antonetti & Maklan, 2014; Elgaaied, 2012; Ghvanidze et al., 2016; Hanss et al., 2016; Joshi & Rahman, 2015; Kaiser & Shimoda, 1999; Rees et al., 2014; Tam, 2013).

Research has indicated that concern and care for the environment may not directly predict PEB, but instead may indirectly influence PEB by influencing how much salience an individual attributes to specific knowledge and behavioural consequences (e.g., those high on environmental concern might seek out more information on green products; Bamberg, 2003).

Perceived consumer efficacy has also been emphasized as an important factor, both in this study and previous research (Hanss et al., 2016; Joshi & Rahman, 2015). In order to make a difference, consumers need to believe that their involvement will drive a market for SPO. However, perceived consumer efficacy maybe related to guilt, pride, and other emotions (Antonetti & Maklan, 2014; Ghvanidze et al., 2016), depending on the strength of the belief in one's consumer power. The interviews highlighted this connection as participants reported that ordinarily, guilt can prompt pro-environmental action, but in the absence of perceived consumer efficacy, can actually lead to distress and inaction, as the individual feels overwhelmed. This result is similar to the findings on research related to fear appeals and increasing self-efficacy (Witte & Allen, 2000). However, though it is propagated that individual consumers can influence manufacturers and retailers of palm oil products (which would theoretically lead to forest and biodiversity conservation), in isolation this may not be practical (Isenhour, 2014; Welch & Southerton, 2019).

These two studies looking at barriers into SPO product purchases concluded that for consumers to purchase SPO, they need to be supported by targeted government policies, such as a national procurement policy of sourcing only SPO (Lange & Coremans, 2020). This would also require mandatory legible labelling of palm oil, especially SPO, in clear and easily understandable terms. Widespread educational campaigns with clear, non-contradictory messages, conducive displays of products in retail stores, and having a minimal price difference between sustainable and unsustainable products, would better enable consumers to perform the desired PEB. Traditionally, there has been a focus on placing the

heavy responsibility of sustainable purchasing entirely on a consumer (Moisander, 2007), effectively ignoring other factors (e.g., relevant capability and opportunity issues) that may be beyond a person's control (Isenhour, 2014; Räthzel & Uzzell, 2019). Studies 2 and 3 explored and situated motivation-related barriers alongside factors of the capability of possessing relevant and accurate information, and the opportunity of perceived availability of products where people generally shop, rather than viewing them in isolation. The results also illustrate that all three categories of the COM-B are implicated in predicting the frequency of SPO-related consumer behaviour.

Finally, in Study 4, close to half of the sample reported never engaging in any action related to purchasing SPO, which is unsurprising and perhaps reflective of the nature of barriers that consumers face (Isenhour, 2014; Sundaraja, Hine, & Lykins, 2020). This highlights the enormous potential to promote the purchasing of SPO in a behaviour change intervention and creates a strong rationale for doing so.

Designing and Evaluating a Behaviour Change Intervention

The preceding studies culminate in Study 5, which involved designing an interactive website intervention to increase consumers' engagement in SPO purchasing behaviour by increasing their knowledge/awareness, perceived product availability and pro-green consumer attitudes—the primary barriers that were identified as significant predictors of SPO purchasing in Study 4. This corresponds to step 4 of CBSM which requires pilot testing the developed interventional strategies. The quasi-experimental design also included two other intervention conditions – an existing promotional video motivating consumers to purchase SPO while imparting knowledge on the issue, and an interactive website on learning to differentiate between real news and fake news, which served as the attentional control condition. The results revealed that the website and video interventions did significantly

increase participants' knowledge/awareness about the palm oil issue and also boosted their SPO purchasing intentions. However, these interventions did not have any impact on pro-green consumer attitudes, and might have inadvertently reduced perceived product availability, which was found to be a significant predictor of SPO consumer behaviour at follow-up.

Increasing knowledge and awareness is an essential first step in the promotion of PEB and green consumerism (Hines et al., 1987; Hungerford & Volk, 1990; Joshi & Rahman, 2015). However, the present study concurs that educational interventions alone are insufficient to promote consumer action, particularly in the face of external barriers (Steg & Vlek, 2009). With respect to palm oil, there are several significant obstacles, including extensive research required on which products contain SPO prior to supermarket shopping, as well as unclear and obscure product labels making it difficult to identify SPO-containing products (Isenhour, 2014; Sundaraja, Hine, Alex, et al., 2021). In the face of these barriers, education alone is unlikely to be sufficient for promoting behaviour change.

Although pro-green consumer attitudes were intentionally targeted by the website intervention, they were not significantly influenced by it. Further, this motivation-related factor did not significantly mediate the relationship between the interventions and SPO purchasing intentions nor follow-up consumer behaviour. Previous research on PEB and food consumption has indicated that interventions targeting motivation-related factors were less effective when compared to manipulating capability and opportunity-related factors (Hanss & Böhm, 2013; Hartmann-Boyce et al., 2018; Pearson et al., 2011; Vermeir & Verbeke, 2006). The results of Study 4 support these previous findings.

Opportunity-related factors are difficult to practically target in an online intervention. Perceived product availability was addressed by specifically providing information on SPO

being a viable alternative to regular palm oil, and then additionally making available an Australian palm oil-friendly shopping guide (with palm oil-free and SPO options), along with a list of brands one could purchase from. However, not only was this insufficient to boost perceptions that SPO products were readily available, but both the website and video interventions also appeared to decrease perceived product availability. One possible reason for this is that knowledge on the multifaceted and complex nature of this problem (Isenhour, 2014; Wright et al., 2019), and the lack of a perfect solution might have highlighted the difficulties in making the "right" consumer decision. As mentioned earlier, palm oil (sustainable or otherwise) is often a hidden ingredient, frequently listed as an obscure "vegetable oil," or as several other more technical terms (Orangutan Foundation, 2019) that are unlikely to be recognized by the average consumer.

The importance of opportunity in the form of perceived availability was highlighted when attempting to understand the intention-behaviour gap where the interventions (website and video) increased SPO purchasing intentions but did not produce significant behaviour change. In Study 4, perceived product availability was highlighted as a factor that was not necessary for SPO purchasing intentions, but important in predicting actual SPO consumer behaviour. The control group reported greater perceived product availability, and also showed a trend towards engaging in more SPO consumer behaviour than both intervention groups (website and video). Further, perceived product availability also was the only factor to significantly distinguish between those who were dissonant (i.e., expressed high intentions, but did not engage in the corresponding behaviour) and those who were either moderately or highly engaged in SPO consumer behaviour. It is possible that in the absence of a palm oil-specific intervention, merely completing the Palm Oil COM-B survey, might have drawn the control group participants' attention to the oil palm issue, and could have nudged them

towards more sustainable consumer behaviour. Without being provided with detailed information, participants might not have perceived difficulty in finding these SPO products.

Limitations of the Research

There were a few limitations associated with each of the four studies. Study 1's ratings on the potential effectiveness of specific behaviour in reducing the negative ecological effects of the unsustainable palm oil industry were obtained solely from experts. Ideally, these ratings could have been supplemented with more "objective" information, such as current carbon emissions, tree cover loss and forest fire occurrences related to the palm oil (Carlson et al., 2012; Carlson et al., 2018). However, there are no concrete data available on how the identified PEBs might influence metrics like rates of deforestation or greenhouse gas emissions, and hence relying on expert ratings in such situations is the recommended approach (McKenzie-Mohr, 2011). Further, experts were recruited from diverse backgrounds, including journalists, scientists, activists, and those involved directly with the palm oil industry, in order to minimize potential biases in responses**.** Secondly, the ratings on probability of adoption and penetration obtained from the community survey relied on self-report. Therefore, these could have been subject to social desirability effects, providing inflated estimates relative to actual behaviour (McKenzie-Mohr, 2011). However, these ratings were used to compare the likelihood of adoption and frequency of engagement across all suggested PEBs, and therefore, any systematic inflation effects would not have impacted the relative ranks of each palm oil-related PEB.

In the qualitative research conducted in Study 2, various methods of sampling had to be adopted in order to recruit participants. It is possible that individuals who tend to be more environmentally conscious might have chosen to participate, resulting in a self-selection bias for participants who were already more motivated to engage in PEB than those who saw the

study advertisement and elected not to participate. However, this was countered by offering credits to students from a regional university known to have a diverse cohort across all adult age groups, and so insights from those who do not self-report as high on environmental consciousness could also be obtained.

An unavoidable limitation shared by Studies 3 and 4 pertained to the Palm Oil-Related COM-B survey used. Except those on knowledge and awareness, all other items pertained to green consumerism in general, rather than being SPO-specific. This was deliberately done because knowledge and awareness about the palm oil issue is not widespread among the general public, and so using SPO-specific items for the other factors might have resulted in invalid data; if participants did not know what SPO was, they would have found it difficult to answer the SPO-specific questions. Therefore, due to this essential modification in the survey items, the scale measured barriers to green consumerism in general, which is assumed to be the umbrella term under which purchasing SPO would fall. To maintain uniformity in Study 4, the same survey was used unchanged for all the three groups.

Another shared limitation for Studies 3 and 4 was that even though participants reported a range of frequencies of their past and/or recent SPO-related consumer behaviour, most people were at the lower end of the range. This implies that very few people actually reported a high level of engagement in SPO-related purchasing, on which the results are based.

Finally, it is essential to point out that the intervention conducted as part of Study 4 was in June 2020, right in the midst of the COVID-19 pandemic. COVID-19 drastically impacted grocery shopping behaviour (Grashuis et al., 2020; Reiley, 2020), particularly in those early months. People were more likely to shop online (where reading labels can be

harder), or if they were shopping in person, did so with haste to minimise exposure to crowded places (Reiley, 2020). Given these circumstances, carefully checking labels, and searching for SPO products was likely low on people's list of priorities. Further, it was observed that there was a tendency to buy familiar brands when shopping online, and a possible dwindling of enthusiasm for sustainable products (Reiley, 2020). If this study could be redone in a non-pandemic era, it would be interesting to see if the results were similar or not, particularly with respect to perceived product availability and SPO-related consumer follow-up behaviour.

Implications

The recent fires set to the Southeast Asian rainforests and the peatlands underneath them continue to destroy precious habitats, release copious amounts of carbon into the atmosphere, and pollute several countries (Wright et al., 2019). The expansion of oil palm plantations contributes greatly to this. Palm oil is found in numerous products, ranging from various food items (mostly packaged and processed) to detergents, self-care products, and cosmetics among others. Changing lifestyles have created a culture of convenience, where people gravitate towards quick meal preparation and processed or junk foods (Brunner et al., 2010). Consequently, there is increased consumption of vegetable oils and sugars (Kearney, 2010). As such, there is an urgent need to address these growing significant environmental and health concerns, while at the same time not limiting the economic development of palm oil producing countries and farmers.

Studies 1 through to 4 demonstrate a systematic framework that is suitable to select target PEB), identify potential barriers and drivers of said target behaviour, and finally use this information to design a behaviour change intervention. Essentially, this thesis combines elements of community-based social marketing (McKenzie-Mohr, 2011) with the Behaviour

Change Wheel (Michie et al., 2011) to address an important ecological issue, and is the first to utilize these approaches in the field of green consumerism.

It is important to acknowledge the complexity and lack of clear direction that sometimes permeates certain environmental issues, like the palm oil crisis. When researchers (such as the authors) and environmental experts (like those interviewed in Study 1) are aware that the suggested target behaviour (of purchasing SPO) has its own pitfalls and challenges, it can be challenging to promote the same. However, despite its problems, the promotion of sustainably sourced palm oil appears to be the solution that might hold the answer – at least for now. It is believed that if consumers drive the demand for sustainable palm oil, this will increase production of the same and would encourage the industry to evolve more sustainably into the future (Lyons-White & Knight, 2018; Schouten & Glasbergen, 2012).

At the same time, understanding barriers that go beyond consumer motivation and responsibility is essential to design effective and appropriate interventions (McKenzie-Mohr, 2011; Michie et al., 2011). It is hoped that this thesis will strengthen the argument that it is unhelpful (and likely ineffective) to place the heavy responsibility of tackling larger issues like climate change by engaging in PEB entirely on individuals or consumers (Moisander, 2007). Such an approach essentially ignores those factors that may be beyond a person's control (Isenhour, 2014; Räthzel & Uzzell, 2019). Behaviour change interventions can potentially influence PEB and green consumerism if they also are able to address barriers related to capability and opportunity, which could require policy changes and environmental restructuring in order to be effective (Michie et al., 2011).

With respect to policy-related change, it is important to highlight that an important aspect of product availability is the clarity and sufficiency of information on labels, which facilitates consumers to make informed choices. In Australia, unfortunately, palm oil need

not be specifically labelled such, and can be subsumed under the generic term 'vegetable oil' (FSANZ, 2017). There was an application submitted to Food Standards Australia New Zealand requesting that it be mandatory for palm oil to be explicitly labelled, owing to its negative ecological effects (FSANZ, 2008). However, this was rejected on the grounds that international environmental issues were beyond the scope of their objectives, and palm oil did not impact the adequacy of supply, quality or the safety of food, which was their primary focus (FSANZ, 2008). Labels that clearly state whether the product contains palm oil – sustainable or otherwise – might go a long way in helping to increase the perceived availability of products with SPO.

Another policy-related suggestion is the implementation of a national procurement policy on SPO. For instance, in 2012, the United Kingdom government put forth a statement on SPO where they committed to achieving 100 per cent sourcing of credibly certified sustainable palm by 2015 (Defra, 2017). While this has not been fully achieved yet, considerable progress has been made, thus increasing the country's sourcing of sustainable palm oil (Defra, 2017). When the county sources only SPO, this relieves consumers of the burden of responsibility, while also contributing to reducing ecological harm caused by the unsustainable palm oil industry.

Strategies pertaining to environmental restructuring (Steg & Vlek, 2009)—for example, having a "pro-environmental" or "sustainable" aisle in the supermarket—could be necessary adjuncts to educational interventions in the green consumerism space. Some informational strategies, like the development of a barcode-scanning mobile application (https://www.sustainabilityhackers.com/sustainable-food-apps/) that detects the presence of palm oil (sustainable or otherwise), might additionally support consumers, as the onus of time-consuming research does not fall on individual shoppers. However, such an application might only be useful if it distinguishes between products containing SPO and those that do

not – applications that only state if palm oil is present or not (Jane, 2018) might be limiting in their scope.

Future Research Directions

This thesis postulates that in designing behaviour change interventions, providing consumers with a large amount of complex information may be counter-productive in promoting green consumption and other pro-environmental behaviour by making the behaviour appear difficult. Future research could explore this relationship further, particularly whether subtle informational strategies, as versus more direct and detailed ones, might better impact pro-environmental behaviour.

It would be important to replicate this intervention in a non-pandemic era to see whether the results differ when people return to previous shopping practices. The current intervention had to be conducted online owing to the social distancing requirements in place at the time of implementation. It would be beneficial to design an interactive face-to-face intervention, perhaps utilising a method like kitchen-table conversations (Gaines, 2018), and evaluate the effectiveness of that type of intervention. One could also look at simulated experiments, where in addition to providing varying degrees of education, the environment can be physically restructured to test the importance of facilitating availability of sustainable products in contributing to behaviour change.

As an entirety, it was beyond the scope of the thesis to explore other palm oil-related PEB beyond sustainable consumption. While Study 1 generated a list of eleven potential PEB that Australians could engage in, including environmental activism, political involvement, philanthropy, and making investments, purchasing SPO products emerged as being the most potentially impactful behaviour based on the Behaviour Prioritisation Matrix in Study 2—because it was something that Australians said they were willing to do that they were not

already doing. This set the stage for the remaining Studies 3 to 5, that focussed entirely on this consumer target PEB. Future research could aim to explore and target some of these other palm oil-related PEB. Requesting manufacturers and retailers to use only sustainably sourced SPO is not only supported by previous research (Wilcove & Koh, 2010), but also experts in Study 2 rated it as the most effective behaviour to reduce ecological destruction. However, this behaviour has the least probability of being adopted by people in the community. Such "hard, but effective" behaviour (Kneebone et al., 2017) could and should be the focus of future studies.

Finally, future research can attempt to apply this framework of combining community-based social marketing and the Behaviour Change Wheel to other aspects of green consumerism or other environmental issues. It would be beneficial to assess the utility of specifically the Behaviour Change Wheel in the pro-environmental space, where it currently has a limited evidence-base (Gainforth et al., 2016; McLeod et al., 2015).

Concluding Remarks

The current thesis involved a series of studies that aimed to understand and encourage a consumer-driven resolution to the ecological destruction caused by the expanding unsustainable palm oil industry. Effectively addressing the palm oil crisis requires a nuanced understanding of the complex trade-offs involving economic, social, and environmental needs of a variety of individuals across the globe.

Viewing this complex issue through the lens of Community-Based Social Marketing practices, the behaviour prioritization matrix was used to select a target PEB in order to ensure the effective allocation of resources for investing in a potential solution (McKenzie-Mohr, 2011). The behaviour most likely to have a desired impact on reducing the ecological damage associated with the unsustainable palm oil industry was determined to be the

purchasing of SPO products. Next, potential barriers and drivers of this behaviour were explored, using the framework of the Capability-Opportunity-Motivation model of behaviour (COM-B), a component of the behaviour change wheel (Michie et al., 2011). Several barriers were identified, some of which are unique to palm oil, including the complexity of the palm oil issue, obscurity around product labelling and the lack of easy access to and availability of SPO products. Barriers that significantly predicted low engagement in purchasing SPO products included a lack of knowledge about issues associated with palm oil production, uncertainty about product availability, and weak green consumption attitudes. These barriers were then specifically targeted in an online behaviour change intervention. While the intervention increased participants' knowledge about palm oil and boosted intentions to purchase SPO products, it did not change actual purchasing behaviour. An important predictor of the outcome behaviour was perceived product availability (a factor linked to opportunity), which was not successfully enhanced by the intervention, despite having provided information about specific products and brands containing SPO to participants.

As such, these findings highlight the importance of addressing all the COM-B factors, particularly opportunity-related factors, in promoting green or sustainable consumption. Often, addressing these factors would require environmental restructuring by policy-level changes that make the desired behaviour easier to perform, thereby facilitating greater pro-environmental behaviour of consumers in this space. Sustainable palm oil production and consumption is a complex, multifactorial issue that will need to be addressed both by consumers in their day-to-day purchasing habits, as well as at governmental and policy levels, in order to move toward a positive environmental and social outcome.

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