What time to adapt? The role of discretionary time in sustaining the climate change value-action gap

Chai, Andreas and Bradley, Graham and Lo, Alex Y. and Reser, Joseph

Griffith Business School, Gold Coast Campus Griffith University, Qld, 4222, School of Applied Psychology, Griffith University, Gold Coast campus, Queensland, Australia 4222, Griffith School of Environment, Griffith University, Gold Coast campus, Queensland, Australia, School of Applied Psychology, Griffith University, Gold Coast campus, Queensland, Australia 4222

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What time to adapt? The role of discretionary time in sustaining the climate change value-action gap

By

Andreas Chai[1] Graham Bradley[2], Alex Lo[3] and Joseph Reser[4].

Abstract: We investigate the role discretionary (non-working) time plays in sustaining the gap between individuals' concern about climate change and their propensity to act on this concern by adopting sustainable consumption practices. Using recent Australian survey data on climate change adaptation, we find that while discretionary time is unrelated to concern about climate change, it is positively correlated with the propensity to adopt mitigating behavior. Moreover, we find that increasing discretionary time is associated with significant reductions in the gap between the concern that individuals express about climate change and their reporting of engagement in sustainable consumption practices.

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[1] Andreas Chai (corresponding author), Griffith Business School, Gold Coast Campus Griffith University, Qld, 4222, a.chai@griffith.edu.au. This research benefited from financial support by the National Climate Change Adaptation Research Facility, The Griffith School of Applied Psychology, and the Griffith Business School's 2013 New Researcher Grant Scheme. Presented at the Institut für Regional- und Umweltwirtschaft, Wirtschaftsuniversität Wien (October 2013) – we thank the participants for useful comments and feedback. The usual disclaimer applies.

2 School of Applied Psychology, Griffith University, Gold Coast campus, Queensland, Australia 4222
3 Griffith School of Environment, Griffith University, Gold Coast campus, Queensland, Australia 4222
[4] School of Applied Psychology, Griffith University, Gold Coast campus, Queensland, Australia 4222

1. Introduction

Individuals and governments alike are struggling with how to adapt to the long term consequences of climate change. For individuals, while many are concerned about climate change, there exists uncertainty about both the personal and societal risks it entails and the effectiveness of mitigation behavior (Gifford, Kormos, & McIntrye, 2011). At the same time, governments around the world are spending millions of dollars every year on 'soft' measures such as public information campaigns to promote the voluntary adoption of sustainable consumption practices (Organisation for Economic Co-operation and Development (OECD), 2002). Research shows that `soft' measures tend to be ineffective because current consumption patterns tend to be locked-in for a range of reasons, including growing affluence (Myers & Kent, 2003), social norms (Sanne, 2002), individual habits (Maréchal, 2010), and "tragedy of the commons" scenarios (Wagner, 2006).

A salient aspect of this behavioral lock-in is the gap between individuals' concerns and their propensity to act on these concerns by adopting sustainable consumption practices (Gifford et al., 2011). This "value-action gap" is seen as a key barrier to effective behavioral climate change adaptation (Brown & Cameron, 2000, Dietz, Gardner, Gilligan, Stern, & Vandenbergh, 2013; Productivity Commission, 2013). We study how this gap is related to individuals' working patterns and their discretionary time. A growing body of literature suggests there are important links between households' time use and their carbon footprint (Jalas, 2002; Druckman, Buck, Hayward, & Jackson, 2012). Beyond affecting what individuals consume, we argue that discretionary time tends to inhibit the ability of consumers to adapt their consumption behaviors in ways that more accurately reflect their attitudes. Working patterns and lack of discretionary time, as well as the mental stress associated with long working hours, can inhibit individuals' propensity to reflect on their concern and accordingly adopt climate change mitigation practices. This shortage of time can also become a very convenient rationale for not acting on concerns, but which is

both transparent and conducive to felt guilt and dissonance. This hypothesis is consistent with the literature on individual differences in stress adaptation (Lazarus & Folkman, 1984) and time orientation (Zimbardo & Boyd, 1999). It also mirrors a long standing conjecture made by the economist Tibor Scitovsky (1976) that patterns of modern work have negative externalities on the extent to which individuals accumulate consumption skills (Bianchi, 2003).

Using recent Australian survey data on climate change attitudes and behavioral responses, we study the strength of the value-action gap and its relationship to a range of socioeconomic factors. This gap is measured as the standardized difference between individuals' overall concern about climate change, on the one hand, and their propensity to engage in a number of surveyed mitigation practices, such as engaging in water conservation or using florescent light-bulbs, on the other. Discretionary time is measured by full-time, part time or non-working (including retired) employment status. Controlling for household income, our results show that while discretionary time is unrelated to concern about climate change, it is positively correlated with the propensity to adopt mitigating behavior. Moreover, we find that discretionary time is associated with reductions in the disconnect between the concern that individuals express about climate change and their reporting of engagement in sustainable consumption practices.

The paper is structured as follows. Section 2 discusses the theoretical background concerning the value-action gap, as well as the emerging literature on sustainability and time allocation. Section 3 outlines the hypotheses and their relationships to theories found in both economics and psychology. Section 4 describes the survey method employed, while Section 5 presents the results of the study. Section 6 concludes with a brief discussion of policy implications.

2. Background

By 2030 an additional 3.1 billion people are projected to enter the middle class around the world (OECD, 2010). Over the same period global energy demand is projected to increase by 40 per cent, and water demand is expected to outstrip supply by 40 per cent if existing consumption patterns do not change (World Economic Forum (WEF), 2012). These trends underline the urgent need to better understand how a rapid transition to more sustainable consumption patterns can be achieved. Most scholars are of the view that governments have to play a strong and proactive role in achieving sustainable consumption patterns as there is general pessimism about the extent to which sustainable consumption patterns will emerge on their own accord. Current consumption patterns appear to be 'locked in' for a range of reasons, including social norms (Røpke, 1999; Lintott, 1998; Sanne, 2002, Myers and Kent, 2003), individual habits (Maréchal, 2010), basic ignorance (Brown & Cameron, 2000), status concerns (Frank, 2001), and consumption settings which resemble "tragedy of the commons" scenarios (Wagner, 2006).

Consequently, the main type of policies being advocated are tax and subsidy measures that rely on making 'green' consumption alternatives relatively cheap and 'brown' consumption activities relatively more expensive (Wagner, 2006). These measures rely on individuals being sensitive to relative price changes and altering their practices so as to minimize the cost of consumption. In addition, several scholars have noted such measures could lead to the crowding out of the voluntary adoption of sustainable consumption patterns (Frey & Jegen, 2001; Claro, 2007; Spash, 2010). This suggests that employing pecuniary incentives to achieve sustainable consumption patterns could in fact contribute to the lock-in of unsustainable consumption patterns, as consumers feel less intrinsically motivated and less morally obliged to voluntary adopt sustainable consumption practices (e.g. Deci & Ryan, 2002).

At the same time, there exists great and increasing concern about climate change among households around the world. A growing body of evidence suggests that the potential for intrinsically-motivated adoption of sustainable consumption practices is increasing. These practices, such as insulating houses and using fluorescent lightbulbs, may considerably reduce household direct carbon emissions (Dietz et al., 2009). For example, a recent OECD survey of 12,000 household around the world found that more than 60 per cent of households would be willing to pay extra for energy from renewable resources (OECD, 2010). Research suggests that under the right conditions, pro-environmental consumer preferences can develop rapidly. Since the 1980s, a number of studies have shown how pro-environmental changes in consumer preferences can be stimulated through non-price factors, including altering social environments to influence consumer attitudes (Ölander & Kahneman, 1995; Thorgson, 1999; van den Bergh, 2008).

It is notable that these studies highlight links between consumers' knowledge of a particular consumption activity and their receptiveness to public information campaigns that promote pro-environmental consumption activity. For example, the likelihood of some actions being motivated by intrinsic motivations was found to be enhanced by such factors as "how interesting the act is to the consumer" and "how much individuals may influence the nature of the act" (Frey, 1993, p. 645). Elsewhere, in a study of consumers who choose to purchase green electricity, Arkesteijn and Oerlemans (2005) found that early adopters were particularly knowledgeable of sustainable energy features and held positive attitudes towards the environment.

A critical issue in this debate relates to how individual concern translates into action. Environmental concern and pro-environmental values are not reliable predictors of behavior. This is known as the 'value-action gap', an ubiquitous social psychological phenomenon which has been defined by the U.K.'s Sustainable Development Commission (2006, p. 63) in generic terms as "the observed disparity between people's reported concerns

about key environmental, social, economic or ethical concerns and the lifestyle or purchasing decisions that they make in practice." In other words, people express concern about the environment but often display little commitment to change their own behaviour accordingly (Barr, 2006; Blake, 1999; Flynn, Bellaby, & Ricci, 2009). Scholars such as Blake (1999) suggest that the value-action gap is a function of complex relationships between individuals and the broader societal and institutional contexts in which they are situated.

In this paper we investigate how this value-action gap is related to working hours and discretionary (non-working) time. Discretionary time is an important element of the everyday context of consumption that has undergone important changes in the post-war economic development of the West (Goodin et al. 2009). With the exception of the US, there has been a historical downward trend in average working hours in developed countries (Lee, McCann, & Messenger, 2007). However, within nations, there is a highly uneven distribution of working hours across households. In particular, among a range of developed countries, it has been found that working hours tend to be positively correlated with household income and educational level (Burton & Phipps, 2007). As Bowles and Pak (2004) note, growing income inequality among several OECD economies has emerged hand-in-hand with growing inequality of working hours across the working population.

The importance of this temporal dimension is generally recognized in environmental psychology in which studies of environmental stress clearly underscore the importance of temporal considerations (e.g., Altman & Rogoff, 1987; Bell, Greene, Fisher & Baum, 2001; Brown, 2002). As such, some have concluded that the progressive reduction in discretionary time is a substantial contributor to environmental load and experienced stress, and directly and adversely impacts on perceived quality of life and subjective wellbeing as well as capacity to act on one's concerns and moral compass (Evans & Stecker, 2004).

However, it has been only recently that scholars have begun to empirically consider how the ways in which individuals allocate their time across different work and leisure activities affect their carbon footprint(Minx & Baiocchi, 2010, Knight, Rosa & Schor 2013). In particular, several studies have examined the relationship between discretionary time and the carbon footprint left by household consumption patterns (Druckman et al., 2012; Jalas, 2002). For example, Druckman et al. (2012) found that leisure activities are generally associated with lower carbon emissions than non-leisure activities. In terms of how changing leisure time actually alters behaviour, other studies have found that increases in leisure time may stimulate a time 'rebound effect' – with increasing leisure time leading to a larger carbon-footprint if households spend more time on energy-intensive and goods-intensive activities (Binswanger, 2004; Brenčič & Young, 2009).

In economics, the important links between working time and the composition of household spending have been recognized since Becker (1965) modelled households as firms that use market goods and time to produce final consumption goods (Biddle & Hamermesh, 1990). Of relevance to understanding the impact of changing discretionary time is the generally accepted conjecture that rising household income increases the opportunity cost of consumption for households. Given that time is costly, high earning individuals will choose those consumption activities that take relatively less time. This argument has also been extended to show that rising opportunity cost of affects the variety of goods consumed. Affluent consumers prefer consumption activities that take less time and are more resource-intensive, relative to alternative activities which take more time, but require fewer goods (Gronau & Hamermesh, 2001).[5]

3. Theory – discretionary time and the value-action gap

This study investigates three hypotheses concerning the relationships between 1) concern about climate change, 2) discretionary time, and 3) the

[5] Other scholars are critical of Becker's framework since time is only seen an input to produce final consumption goods. His framework thereby ignores the actual time need to consume good, and how the duration of consumption affects the utility attained from consumption (Steedman, 2001).

value-action gap. The main contention is that a greater amount of discretionary time facilitates the extent to which consumers adapt their consumption behavior to be more consonant with their attitudes. This influence takes place independently of the extent to which consumers subscribe to the goal of achieving more sustainable consumption.

The first hypothesis posits that there is no significant relationship between the extent to which individuals are concerned about climate change and their discretionary time. While a number of theories suggest that discretionary time affects the ability of individuals to *act* on concern (discussed below), there is little to suggest that it affects climate change concern *per se*. Indeed, surveys conducted around the world suggest that most individuals accept that climate change is real and most express at least some level of concern about it (Uzzell 2000; Krosnick, Holbrook, & Visser, 2000; Leviston & Walker, 2012; Nisbet & Myers, 2007). It is of course likely that individuals with more discretionary time have more exposure to climate change related information via the mass media and social interaction. However, given the fundamental way in which climate change will affect living standards in the future, it is likely that individual concern for this issue will, if at all, already be triggered with minimal exposure to climate change related information.

H1: Discretionary time is unrelated to climate change concern.

The second hypothesis states that greater discretionary time increases the extent to which individuals engage in mitigation practices. Apart from pecuniary costs involved in adopting sustainable consumption practices, many of such actions require considerable discretionary time. Here we focus on two broad categories that are distinguished by a difference in the time required to complete them and with respect to the monetary cost to the consumer. On the one hand we label as “purchasing practices” those actions undertaken during the actual purchasing process which are intended to reduce an individual’s carbon footprint. This includes such practices as buying fluorescent lightbulbs and buying fuel efficient cars. On the other

hand, we label as “conservation practices” those actions which relate to mitigation practices made in the use of goods and services (Dietz et al., 2013).

When considering the everyday context in which such practices potentially take place, we propose that a key difference between purchasing and conservation practices is that the latter requires more additional discretionary time than the former. This is because, firstly, conservation practices require frequent and repetitive acts that take up more time than purchasing practices in which individuals simply alter the type of goods purchased. Conserving electricity, for example, implies frequently checking the house to ensure that lights are switched off. Using less petrol implies walking, which takes relatively longer than driving using the car. Buying ‘green’ food products or renewable energy, on the other hand, is relatively quick alteration of existing purchasing practices.

Secondly, when one considers the complex and interacting set of activities and goals that makeup the consumers’ lifestyle (Earl 1986), a key criteria for time poor individuals choosing certain mitigation practices among others is how well they complement other consumption activities that individuals wish to undertake. In terms of the hedonic nature of consumption and the type of behaviour which will be reinforced, a key and relatively uncontroversial goal among contemporary consumers is to minimise time spent on ‘defensive’ activities’ - acts which are done to avoid exposure to pain- and spend more time on ‘creative’ activities – acts which are undertaken to gain exposure to pleasurable stimulus (Scitovsky 1976, Bianchi 2002). In this sense, conservation practices, such as the act of recycling, are not complimentary to other types of creative leisure activities that individuals wish to undertake in their spare time. Rather, time spent recycling is probably associated with tedious household duties such as cleaning the kitchen which individuals wish to minimize (Godbey et al., 1998). Similarly, the act of conserving fuel and conserving electricity by switching off lights in the house are repetitive acts that are seldom associated with positive hedonic value and are likely viewed as a painful

'chore' by individuals. In contrast, purchasing practices are more likely to be temporally associated with creative consumption acts such as shopping that deliver positive hedonic value to consumers (Earl and Potts 2000). This association arises because individuals tend to lump their purchasing activities together: a single trip to the shopping mall will be done to undertaken each week to complete a number of purchases. Such complementarities are another reason why time poor individuals tend to adopt purchasing practices rather than mitigation practices. On the other hand, individuals with relatively more discretionary time may have a greater degree of flexibility in terms of choosing to adopt purchasing or conservation practices.

> H2: Discretionary time is positively related to engagement in sustainable consumption practices.
>
> H2A: The influence of Discretionary on sustainable conservation practices relatively strong in relation to its effect on sustainable purchasing practices.

The third and main hypothesis we investigate is that there exists a negative relationship between discretionary time and the value-action gap: The less discretionary time individuals possess, the greater is the gap between their concern for climate change and their propensity to act on this concern. This hypothesis derives from the notion that working patterns have not only increased the opportunity cost of consumption, but also affected the manner in which consumers learn and adapt in relation to consumption activities. In this regard, Scitovsky (1976) argued that the nature of modern work increasingly requires a growing number of professional and vocational skills which tend to 'crowd out' consumption skills and knowledge. This idea relies on the notion that consumers have limited cognitive resources that can be devoted to learning across work and leisure activities, a notion that is reminiscent of Herbert Simon's emphasis on bounded rationality (Simon, 1956).

This hypothesis gains support from at least three bodies of psychological theory and research. First, there is the literature that deals with inconsistencies between attitudes (including attitudes expressing concern) and behaviors. These discrepancies occur because behaviour is multiply-determined. Past theory and research has identified a range of factors other than attitudes (including values, habits, self-identity, decision-making processes and competencies, worldviews, cultural and geophysical variables) that influence behaviour (Gifford et al., 2011). Ajzen's (1991) Theory of Planned Behavior, for example, proposes that, in addition to attitudes, two important predictors of behavior are subjective norms and perceived behavioral control. According to this theory, environmental concern is not likely to translate into pro-environmental behavior if subjective norms operate in a contrary direction and/or if people believe that such behavior is beyond their control. Applied to the current issue, significant others may communicate to time-poor people that they are not expected to act on their concerned attitudes and/or time-poor people may themselves judge the required pro-environmental behaviors to be too time-expensive to be feasible. In contrast, the availability of discretionary time has the effect of removing some of the social and practical constraints upon acting in ways congruent with one's attitudes, thereby serving to narrow the value-action gap.

Theory and research into responses to psychological stress provide a second foundation in support of our third hypothesis. Longer working hours are associated with psychological stress (Sturges & Guest, 2004). Research shows that, under stress, people narrow the focus of their attention and tend to revert to familiar, well-learned, habitual behaviors (e.g., Evans & Lepore, 1997; Saegert, 1976). Many pro-environment behaviors are not deeply ingrained and require conscious effort. Hence, as stress levels increase, individuals become less likely to display these behaviors. To the extent that the provision of time reduces feelings of stress (urgency, pressure, etc.), it will encourage people to widen their horizons (cognitively, socially, temporally, geographically, etc.) and potentially display a broader

range of adaptive behaviors, including pro-environmental ones. Consistent with this, Fredrickson's (2001) broaden-and-build theory shows that, while negative affective states narrow our perspectives, positive states – as might be established through the provision of leisure time – encourage a broadening of our behavioral repertoire and a building of capacity for future use. Thus, available time acts as a stress-reducer, and this in turn triggers a more considered and adaptive set of behavioral responses. In terms of Zimbardo and Boyd's (1999) theory of time perspective, this widening of horizons takes the form of a shift from a present-oriented, to a future (and more altruistic), perspective.

Third, several psychological theories – including Hobfall's (2011) Conservation of Resources (COR) theory and Demerouti, Bakker, Nachreiner, & Schaufeli's (2001) Job Demands-Resources (JD-R) theory – argue that people need, strive to attain, seeks to protect, and ultimately benefit from possessing, personal and contextual resources. Resources are of many kinds, but one important resource is time. According to these theories, without resources, exhaustion and burnout are likely; with resources, people become energised and engaged in their chosen activities. Thus, when depleted of resources such as time, individuals shift their focus towards conserving and protecting what few resources they possess, rather than engaging in other discretionary activities. As suggested in the previous paragraph, many pro-environmental behaviors are time-consuming and effortful; in the language of COR and JD-R theories, they are resource-depleting. As such, they are likely to be avoided. It is only when resources (such as time) are plentiful and are not under threat, that people turn their attention to other priorities, including, perhaps, acting on their environmental concerns.

> H3: Discretionary time is inversely related to the gap between climate change concern and engagement in sustainable consumption practices.

4. Method

An anonymous, online web-based survey consisting of 120 items related to climate change knowledge, experiences, attitudes, concerns, and mitigation practices was conducted across all states of Australia in mid-2010 (Reser et al., 2012a). A professional survey firm (Qualtrics) was employed to randomly select a gender-balanced cohort of panel members residing in each of 35 geographical regions. Response rates are unknown. The final sample comprised 3096 Australian citizens (47% male, 53% female) over the age of 15 years. Approximately 80% of the sample was aged in the range 25 to 65 years. Geographically, 71% of respondents described their residential circumstances as either urban or suburban, a further 17% as 'country town', and 12% as rural or rural residential. In terms of annual household pre-tax income, approximately half the sample reported incomes between AUD$40,000 and $100,000 (approximately US$37,800 to US$94,300), with approximately one quarter reporting more, and another quarter reporting less, than this range.

Information about respondents' discretionary time was attained from employment status ($time_i$). Respondents were asked whether they were: working full time (defined as 30 or more hours a week), part time (up to 30 hours a week), unemployed, retired, home carers, studying, or not working. See Table 1. For the purposes of the current analyses, this data was aggregated into three categories: full-time (41 per cent), part-time (21 per cent) and other (28 per cent). Around 10 per cent of respondents were excluded as they did not belong to any of these categories. We recognize that this is an imperfect proxy for discretionary time as individuals who are home carers or studying may in fact have very little discretionary time.

In addition, working time is likely correlated with income. To properly discern the effect of discretionary time, it is therefore vital to separate its influence from the influence of income. The survey enables us to this as it collect data on these influences on two different levels of aggregation: income is recorded on the income level and discretionary time is recorded on

the individual level. Hence many respondents may be in a high income household, but their individual working hours may be relatively low given that is often a single spouse who earns most of the household income. Likewise, there are individuals who are relatively poor but work long hours and thus possess little discretionary time. This variation between discretionary time and household income is reflected in the relatively low correlation coefficient (0.42) between these variables found in our data. Concern about climate change (c_i) was measured using the question "how concerned, if at all, are you about climate change?" Responses were on a 5-point scale from "Not at all Concerned" to "Very Concerned".

To assess mitigation actions (m_i), respondents were asked what actions they were currently undertaking to reduce their carbon footprint (see Table 2). These consisted of a series of Yes/No questions that covered a diverse range of 15 actions. Its worth noting that some these appear to be overlapping. For example, one could expect "reducing vacation travel" to be highly correlated with "reducing air travel". To check for multicollinearity, we examined the correlation coefficients between these actions. Contrary to our expectations, correlations between most actions were relatively low, the highest being (0.67) between driving less and using less petrol.

In the following analysis we infer the consumer's general tendency to engage in mitigation practices from the total number of mitigation practices they are reported to have engaged in. This is a relatively imperfect approach, as not every individual may be in a position to engage in each of the mitigation practices. For example, in case respondents do not own a car, this would rule them out from possibility of "driving around less". By and large however, it is not controversial to claim that most households do have some capacity to engage in most the described practices. In other words, we assume most household do possess cars, use electricity, buy food an so on. Moreover, this measure does not include information about how frequently the mitigation practices were undertaken or the magnitude of their pecuniary cost (relevant for purchasing decision). Unfortunately, the survey did not include such information that would help us develop a more

accurate empirical measure of respondent's mitigation. Nevertheless, in spite of such biases, we maintain that it is possible to infer the respondents tendency to engage mitigation practices from the total number of reported mitigation practices does reflect, albeit in an imperfect way.

TABLE 1 and 2 about here

In terms of the explanatory variables, a range of variables were used in the study, the descriptive statistics for which are reported in Table 2. The control variables cover a wide range of factors thought to contribute to both level of concern and propensity to engage in sustainable consumption practices:

i. Climate response variables (res_i) includes a variable designed to capture the individuals' objective knowledge of climate change , as well as one that approximates their belief in/acceptance of climate change. The former is a composite indicator that was built from responses to a series of true/false responses to facts about climate change that are designed to gauge how much individuals know about climate change (see Appendix J in Reser et al., 2012a). Statements included "Globally, the current burning of fossil fuels accounts for 80-85% (CO2) emissions added to the atmosphere". The latter was also a composite indicator that was built from responses asking to individuals about the extent to which they agree with statements such as "I am certain climate change is happening" and "As far as you know, do you personally think the world's climate is changing, or not?" (see Appendix J in Reser et al., 2012a).

ii. Social influence (soc_i) includes the number of pro-environmental films/documentaries such as *"An inconvenient truth"* that the respondent viewed (ranges between 0-15**,** "Media Exposure"), as well as extent to which people discuss their thoughts and feelings about

climate change with others ("discuss with peers", 5 point Likert scale). We anticipated that these factors would have a positive relationship with concern and behavior.

iii. Demographic Variables (dem_i), include respondents' age, gender (dummy variable), whether they have children (dummy variable), level of education, income, and urban density.

iv. Climate experience variables (exp_i) include whether individuals have experienced a natural disaster or warning (dummy, "disaster experience"), and the frequency of experience of bad weather events such as storms and drought (5 point response scale, "Freq. Weather"). We expected these factors to have a positive effect on concern and behavior.

A combination of OLS and discrete choice regression techniques was used to investigate the three hypotheses. In the case of the hypothesis about climate change concern (H1), because the dependent variable c_i took on a number of discrete states that were ordered, we used an Ordered Logit model to study the factors contributing to increasing climate change concern (Train 2009). Concern was regressed against discretionary time, as well as control variables related to the respondents' demographic background (dem_i), social interactions (soc_i), level of adaptation (res_i), as well as the climate change experience variables (exp_i) :

$$c_i = \beta_0 + \beta_1 time_i + \beta_2 soc_i + \beta_3 res_i + \beta_4 exp_i + \epsilon_i \qquad (1)$$

In relation to the hypothesis on mitigation behavior (H2), an OLS regression was estimated:

$$m_i = \beta_0 + \beta_1 time_i + \beta_2 soc_i + \beta_3 res_i + \beta_4 exp_i + \epsilon_i \qquad (2)$$

In a second step, for H2A we disaggregated the fifteen behaviors into purchasing practices including florescent light bulbs, energy from renewable sources and carbon offsets, and conservation practices, which focused on action related to the conservation of existing resources such as using less water and using less petrol. We also checked the robustness of the results by running an Ordered Logit regression (instead of OLS) in which the frequency of mitigation were aggregated into six categories (0, 1-3, 4-6, 7-9, 10-12, 13-15). Results were found to be identical with those reported below.

In relation to the value-action gap, past studies have generally sought assess this gap by measuring the extent to which behavior is consistent with concern (e.g. Blake, 1999). To get preliminary idea about this gap, Figure 1 below that displays the joint distribution between respondents concern about climate change (x-axis, defined as $\frac{c_i}{C}$- see below) and their propensity to engage in mitigation behaviour (z axis, defined as $\frac{m_i}{M}$ - see below). The Figure shows that concern is positively correlated with the propensity to adopt mitigation practices. However there is a much wider spread of the propensity to engage in mitigation behaviour around the average among respondents who are "very concerned" (rightmost distribution). This already indicates there is a large share of individuals that possess a large value-action gap.

To formally the determinant of this gap (H3), we rescaled c_i and m_i so that they were expressed in percentage terms between 0 and 1. This was done by dividing each variable by the maximum, $C = 5$ in the case of concern and $M = 15$ in the case of mitigation behaviour. The resulting two variables were positively correlated at r = .385. For each respondent, we then calculated the simple difference between these terms to derive the value-action gap variable, which ranged between 1 and -1.[6]

$$gap_i = \frac{c_i}{C} - \frac{m_i}{M}$$

[6] For robustness, we also ran a regression on the ratio between the rescaled variables, and results turned out to be robust.

A value of 1 represents the case where the individual has strong concern for the environment, but engages in no mitigation behavior. On the other hand, a value of 0 represents the case where there is no difference between levels of concern and propensity to engage in mitigation behavior. This could include both people who have a high level of concern and engage in many types of mitigation behavior, as well as those who have low concern and engage in a small number of mitigation behaviours. It is also possible that gap_i is negative, where a score of -1 reflects the case in which individuals engage in all 15 behaviors, but are not at all concerned about climate change. Initial analyses revealed only a small percentage of individuals (12 per cent) with negative gap values. To check the robustness of our variables, the variable, $gap2_i$ excludes this 12 per cent.

5. Results

5.1 Concern over Climate Change.

Column 2 in Table 4 reports the regression results for Hypothesis. Note that in an ordered logit model only the signs of coefficient can be estimated, not the magnitude of the coefficients (Train, 2009). As expected, the extent to which respondents had knowledge of, and belief in, climate change was positively correlated with their concern about climate change. The extent to which respondents discussed climate change with peers or were exposed to climate change-related media content was also positively and significantly correlated with climate change concern. Moreover, discretionary time had no significant influence on concern, which confirms H1. Indeed, none of the factors that can be considered as 'constraints' on the individual's learning ability, including education and income, were found to have a significant influence on climate change concern. Climate change concern thus appears to be a relatively universal phenomenon in the sense that it traverses individuals across different income classes, education levels and discretionary time profiles.

It is worth noting that gender has a very strong influence on concern, where the value of 0 represents males, while 1 represents females. Thus, being

female is associated with a low likelihood of not being concerned about climate change. These findings, that levels of concern are higher in females than in males, that they are positively correlated with climate change knowledge and belief, and that they are not strongly related to other demographic variables such as age and education, are broadly consistent with findings from a range of past studies (Gifford et al., 2012; Weber & Stern, 2011; Wolf & Moser, 2011).

Regarding the climate experience variables (exp_i), a salient finding was that while having some experience of a disaster is positively related to concern for climate change (the dummy variable for disaster experience is significant and the sign is positive), the higher the frequency of extreme weather events, the less concerned respondents appear to be about climate change. As noted by Reser et al. (2012b), this result could suggest that some type a habituation process is taking place, whereby individuals become desensitized to the risks of climate change as their experiences of bad weather increase. Other psychological models that could account for this finding include the General Adaptation Syndrome model; allostatic load (e.g., McEwen, 2004); a 'finite level of worry' (e.g., Weber, 2006); stress response and optimal level theory (e.g., Arkes & Garske, 1982); and learned helplessness (Seligman, 1991).

5.2 Mitigating Practices

Columns 3, 4 and 5 in Table 4 report results addressing mitigation behaviour. Similar to the case for concern, all res_i and soc_i variables were found to be positively correlated with mitigation behaviors. However, climate experience (res_i) variables appear to have no impact on the propensity to engage in mitigation behavior, which stands in contrast to the results on climate change concern. Conversely, age, education, and income are related to propensity to adopt sustainable consumption practices, with education having a positive impact and income a negative impact. In relation to the demographic variables, We found the negative sign for the income coefficient somewhat curious. It was expected that high income individuals would have

a greater willingness to pay for pro-environmental goods. We suspect the negative association is due to the fact that many of the mitigation measures used are not related to spending behaviour. Rather they more specifically describe conservation actions, which require time to execute.

To verify this, as noted above, we disaggregated the mitigation actions into purchasing behaviors (column 4) and conservation behaviors (column 5). The disaggregated results reveal that the relationship between income and mitigation spending behavior was positive, while that between income and conservation behavior was negative. These also confirm Hypothesis 2A as discretionary time has a positive and significant influence on conservation behavior, but relative little influence on purchasing behavior.

In support of Hypothesis 2, the coefficient for discretionary time has a positive and significant influence on mitigation behavior. This suggests that individuals with more discretionary time possess a higher propensity to engage in mitigation practices. Disaggregate results show that this was more the case for conservation, than purchasing, behaviors. This makes sense since the time taken to purchase goods and services would be relatively constant among employed, unemployed and part-time employed respondents, whereas conservation behaviors are more time-costly, as discussed above. This result is also consistent with the economic theory that people who are time poor avoid activities that are relatively time costly (discussed above). If someone has scarce time and needs to choose between mitigation practices that vary in their time cost, they will likely choose those practices which take less time, which in this case would be purchasing more sustainable alternatives, rather than engaging in conservation behaviors.

5.3 The Value-Action Gap

Table 5 reports results addressing the value-action gap. In terms of the demographic variables, it is interesting to note that age has a significant effect on the value-action gap. There are two possible explanations for this. From the economic perspective, as individuals tend to accumulate more consumption experiences and consumption skills with age, there may be a

commensurate increase in their ability to modify behavior in a way that efficaciously fits with their attitudes. Supporting this conjecture is the finding that the correlation coefficient for education is positive, though the effect is not significant. Age is another factor which is presumably positively correlated with consumption knowledge that also has a negative impact on the value action gap. On the other hand, it could be the case that older people feel a greater obligation to act on the issue of climate change than younger people. Here it is worth noting that the dummy variable for children also has negative (though not significant) impact on the value-actions gap, indicating that individuals with children may be more inclined to act. However, given the time-costly nature of child rearing, it is perhaps no surprise that this variable is not significant.

Our main finding is that consistent with Hypothesis 3, increasing discretionary time is negatively and significantly correlated with the value-action gap. This indicates that, with greater discretionary time, the difference between climate change concern and propensity to engage in mitigation behaviour reduces. It is worth emphasizing here that we have controlled for the effect of household income; thus, the result for the coefficient for discretionary time does not represent the effect of income on the value-action gap. This result is robust across gap and gap2, where the latter includes only those respondents for whom climate change concern was greater or equal to their propensity to engage in mitigation behavior. Irrespective of whether we consider the entire sample or only those respondents for whom the gap is positive, increasing discretionary time reduces the value-action gap.

Finally, a puzzling though interesting result was obtained for the relationships between the response variables (res_i) and the size of the gap: On the one hand, objective knowledge of climate change was negatively (but not significantly) associated with the gap, which suggests that individuals who know more about climate change had relatively smaller value-action gap. On the other hand, belief in climate change had the opposite effect: it was positively and significantly associate with the gap. This result suggests

that many people who strongly believe in climate change may in fact be doing very little to reduce their carbon footprint. This could be because they view climate change as an inevitable and unavoidable event. Thus any effort to mitigate climate change from their perspective would be pointless. In this way, the positive and significant association between belief in climate change and the gap can be viewed as evidence for some degree of maladaptation based on low perceived personal efficacy among respondents. In contrast, the negative effect of knowledge implies that greater knowledge and understanding of climate change brings with it an enhanced awareness of how to act upon one's concerns.

6. Conclusion

The results of this study highlight how the everyday context of consumption and working patterns may represent an important barrier to effective behavioral engagement with climate change that has been underemphasized in the literature. While many previous studies have argued that forces driving the behavioral "lock in" of current consumption patterns are due to social or individual forces, few show that a lack of discretionary time can also play a powerful role in preventing individuals from acting and adapting their consumption patterns in ways that efficaciously reflect their concern about climate change (see, e.g., Gifford et al., 2011). This study has provided preliminary empirical evidence that discretionary time does indeed play such a role, since holding constant household income and other factors, the value-action gap appears to decline among individuals with relatively more discretionary time.

The results underline the need to consider how working conditions affect the achievement of sustainable consumption patterns. Currently there are few options available to policymakers to achieve sustainable consumption patterns. The need to better understand behavioral barriers to achieving sustainable consumption is pressing given that common tax and subsidy measures are slow and costly to implement, and could lead to the crowding out of the voluntary adoption of sustainable consumption patterns (Claro,

2007; Frey & Jegen, 2001). A sustainable consumer economy requires greener workplace measures, such as incentives for working from home, particularly for full-time employees. Our results suggest that such measures would not only directly reduce carbon footprint emissions by reducing the need to use transport, but would also indirectly help reduce carbon emissions by endowing individuals with more discretionary time which can help foster reductions in the value-action gap.

We conclude by acknowledging that there are several shortcomings in this study that deserve to be tackled in future work. First, future surveys on climate change adaptation should collect information on non-leisure, household production activities undertaken by respondents. In addition, more accurate data could be obtained on working hours, as well as the type of work under taken by respondents. In this way, a better understanding and conceptualisation could be achieved as to how adaptation dynamics vary across different occupations and industries. Finally, the results suggest that it would also be worth explicitly capturing the ways in which consumer skills and accumulated experience affect the value-action gap. Open questions also remain about how past consumption experience affects this gap. Does such experience leave consumers with more knowledge that enables them to act on their concern? Or is it the case that accumulated experience renders individuals increasingly inflexible in altering their existing consumption experiences? Given the urgent need to achieve a rapid transition to sustainable consumption patterns, more work needs to be done in each of these directions.

Finally, our results about how 'belief' versus 'knowledge of' climate change had different effects on the value-action gap highlight how the psychological adaption to climate change is not a simple process: the emotional and cognitive process in which individuals come to terms with climate change does not necessarily imply taking action or behavioural responding (Reser et al, 2012b,c; Reser & Swim, 2011). In this adaptation process, the dynamic perceptions of available time and the effectiveness of personal actions undoubtedly play important roles in shaping cognitive and emotional

responses to climate change. In particular, perception of time can become an integral part of sense making and rationalisations with respect to why actions are not taken or becoming more behaviourally engaged with this profound issue. This is not say that available and discretionary reflective time and psychological 'space' are not important considerations when considering psychological adaptation. But it is likely that available time - and associated reduced environmental pressure and experienced stress - are important in rather different ways

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Table 1.

Employment Status of Respondents

Status	Frequency	Per cent
Working Full-time (30+ hrs. per week)	1,172	40.61
Working - Part-time (up to 30 hrs. per week)	604	20.93
Unemployed seeking work	91	3.15
Unemployed - not seeking work	25	0.87
Not working - retired	470	16.29
Not working - looking after house/child	246	8.52
Not working - disabled	129	4.47
Student	149	5.16
Total	2,886	100.

Table 2.

Mitigation Behavior

Survey Question: A person's "carbon footprint" is the amount of greenhouse gases put out as a result of his or her energy use. This includes energy used directly, like electricity and fuel, as well as the energy it takes to make and transport all the products you use. What actions are you currently taking to reduce your carbon footprint? (Please tick any that apply)	
Behavior	% of respondents
Recycling	88.2
Using compact florescent light bulbs	82.8
Using less water	79.7
Using less electricity	79.2
Driving less	48.4
Using less petrol	48.4
Walking/bicycling/scootering	40.3
Buying local food/organic food/growing own food	39.9
Buying/using smaller/more fuel efficient car	34.0
Using trains/buses/subways/other public transport /mass transit	25.9
Reducing travel/vacation travel	24.1
Buying energy from renewable sources/hydro/wind /solar power	17.9
Reducing air travel	17.8
Carpooling	9.8
Buying carbon offsets	5.8
Nothing	2.8
Other	3.9

Note. Most of the behavior variables correlated in the low to moderate range, the highest being between “driving less” and “using less petrol” ($r = 0.67$). The question asked was “What actions are you currently taking to reduce your carbon footprint?”.

Table 3.

Descriptive Statistics for Explanatory Variables

Variable	Mean	S. D.	Min.	Max.
Age	46.20	14.57	19	108
Dummy – Gender	0.47	0.50	0	1
Discretionary Time	1.98	0.89	1	3
Education	3.12	1.09	1	5
Dummy – Children	2.34	0.95	1	5
Urban Density	0.60	0.46	0	1
Dummy – Freq. of Weather	0.17	0.70	0	5
Knowledge of Climate Change	2.67	2.92	-7	10
Income	3.01	1.68	1	7
Belief in Climate Change	15.87	4.18	4	20
Media Exposure	1.48	1.49	0	13
Discuss with Peers	3.54	1.59	1	6
Dummy – Disaster Experience	1.63	0.48	1	2

Note. The correlation matrix between dependent variables reveals no highly correlated variables, the highest being between knowledge and belief in climate change (r = .51).

Table 4.

Predictors of Climate Change Concern and of Mitigation Behavior.

	Concern (ord. logit)	Mitigation Behaviors: All Behaviors	Purchasing Behaviors	Conservation Behaviors
Psych. Response				
Knowledge of	0.057*	0.117*	0.041*	0.051*
Std. error	0.015	0.019	0.008	0.012
P-value	0.000	0.000	0.000	0.000
Belief in climate	0.438*	0.146*	0.036*	0.080*
Std. error	0.015	0.013	0.005	0.008
P-value	0.000	0.000	0.000	0.000
Social Interaction				
Discuss with Peers	0.231*	0.361*	0.110	0.174*
Std. error	0.027	0.033	0.013	0.020
P-value	0.000	0.000	0.000	0.000
Media Exposure	0.115*	0.314*	0.090	0.152*
Std. error	0.028	0.034	0.013	0.020
P-value	0.000	0.000	0.000	0.000
Discretionary Time	-0.068	0.184*	-0.014	0.132*
Std. error	0.049	0.061	0.024	0.036
P-value	0.158	0.002	0.534	0.000
Demographic				
Age	-0.002	0.024*	0.012*	0.016*
Std. error	0.003	0.004	0.001	0.002
P-value	0.542	0.000	0.000	0.000
Education	0.044	0.146**	0.076**	0.012
Std. error	0.033	0.046	0.018	0.028
P-value	0.191	0.002	0.000	0.658
Income	-0.037	-0.112*	0.004	-0.102*
Std. error	0.026	0.032	0.012	0.019
P-value	0.150	0.001	0.742	0.000
Urban Density	-0.028	-0.178	0.037	-0.068
Std. error	.0925	0.115	0.046	0.069
P-value	0.763	0.137	0.419	0.326
Gender[a]	-0.544*	-0.380*	-0.221*	-0.124**
Std. error	0.080	0.099	0.039	0.060
P-value	0.000	0.000	0.000	0.037
Children[a]	-0.002	0.049	0.067*	0.037
Std. error	0.042	0.052	0.021	0.031
P-value	0.954	0.341	0.001	0.236
Climate experience				
Freq. Weather [a]	-0.544*	-0.001	-0.005	0.020
Std. error	0.080	0.073	0.041	0.044
P-value	0.000	0.986	0.906	0.647
Disaster exp. [a]	0.195	0.034	-0.004	0.004
Std. error	0.085	0.105	0.042	0.063
P-value	0.021	0.742	0.906	0.948
Intercept	4.13 6.89 9.76	0.569	-0.253	0.020
Observations	2766	2811	2811	2811
P-value (see note)	0.0000	0.0000	0.0000	0.0000
R^2*(see note)*	0.2937	0.2517	0.1688	0.2005
Log likelihood	2119.90			

Note. For the regression analyses predicting behavior (columns 3-5), the Breusch-Pagan test revealed no evidence of heteroscedasticity: H_o that the variance is homoscedastic was not rejected ($p = .364$).

[a] Dummy variable

* $p < .05$. ** $p < .01$.

Table 5.

Summary of Regression Analyses Predicting Two Indices of the Value-Action Gap.

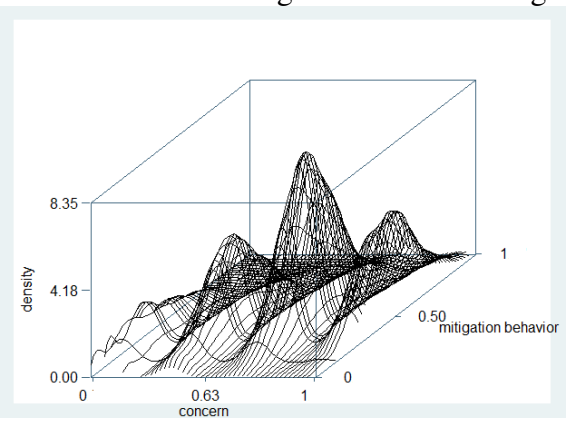
	Gap	**Gap2**
Knowledge of climate	-0.002	-0.002
Std. error	0.002	0.001
P-value	0.279	0.078
Belief in climate change	0.025*	0.018*
Std. error	0.001	0.001
P-value	0.000	0.000
Discuss with Peers	-0.006**	-0.008*
Std. error	.002	.003
P-value	0.032	0.002
Media Exposure	-0.013*	-0.008*
Std. error	.002	.003
P-value	0.000	0.003
Discretionary Time	-0.019*	-0.010*
Std. error	.005	.005
P-value	0.000	0.027
Demographic		
Age	-0.002*	-0.001*
Std. error	0.000	0.000
P-value	0.000	0.000
Education	-0.007	-0.002
Std. error	0.004	0.003
P-value	0.068	0.521
Income	0.003	0.001
Std. error	0.002	0.002
P-value	0.152	0.619
Urban Density	0.011	0.007
Std. error	0.009	0.009
P-value	0.278	0.365
Gender [a]	-0.021**	-0.012
Std. error	0.008	0.007
P-value	0.012	0.102
Children [a]	-0.004	-0.004
Std. error	0.004	0.003
P-value	0.356	0.257
Climate experience		
Freq. Weather [a]	0.002	0.002
Std. error	0.006	0.008
P-value	0.773	0.758
Disaster exp. [a]	0.009	-0.002
Std. error	0.009	0.006
P-value	0.285	0.753
Intercept	.0519	0.175
Std. error	.037	.033
P-value	0.159	0.000
Observations	2766	2414
P-value	0.0000	0.0000
Adjusted R^2	0.2151	0.1476

Note. Gap is based on the entire sample. *Gap2* excludes 12 per cent of respondents for whom the propensity to engage in mitigation actions was greater than their degree of concern for the environment, i.e., it includes only those respondents where gap is positive.

[a] Dummy variable

* $p < .05$. ** $p < .01$.

Figure 1: The join destruction of climate change concern and mitigation behaviour



Note. The x-axis plots normalize concern about climate change based on a 5 point Likert scale: the score 1 represents being "very concerned", while 0 represents "not all concerned. The Y axis displays the frequency of responses, while the Z axis represents the propensity to engage in mitigation behaviour. Here 1 represents adopting a wide range of mitigation practices, 0 represents engaging in no mitigation practices see text for definition.