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**Materialism, Personal Well-being and Environmental  
Behaviour: Cross-national and Longitudinal Evidence from  
the UK and Chile**

Thesis submitted by Wenceslao Unanue to the University of Sussex for the  
qualification of Doctor of Philosophy in Psychology

September 2013

I hereby declare that this thesis has not been and will not be, submitted in whole or in part to another University for the award of any other degree.

**Signature:**.....

**UNIVERSITY OF SUSSEX****DOCTOR OF PHILOSOPHY IN PSYCHOLOGY****MATERIALISM, PERSONAL WELL-BEING AND ENVIRONMENTAL  
BEHAVIOUR: CROSS-NATIONAL AND LONGITUDINAL EVIDENCE FROM  
THE UK AND CHILE****SUMMARY**

This thesis investigates how materialism is related to personal well-being, as well as to environmental behaviour. I tested key assumptions in the field, both cross-sectionally and longitudinally, in two samples of adults from two different cultures, the UK – an established mass consumer society – and Chile – a fast-growing economy. Results are presented in the form of three papers. Using a cross-sectional analysis, I showed in Paper 1 that materialism was associated with lower levels of well-being in both countries. Importantly, both need satisfaction and need frustration mediated the link between materialism and well-being. Notably, need frustration played an incremental explanatory role, above and beyond the role of need satisfaction. In Paper 2, I explored the hypothesized link between need satisfaction/frustration and well-being in greater depth. Employing a cross-lagged longitudinal design over 3 years, I found that in both countries, higher total need satisfaction (versus frustration) was a significant prospective predictor of higher well-being. However, when separate needs for autonomy, competence and relatedness were distinguished, only relatedness reached statistical significance in the UK, and none of the three needs individually predicted well-being in Chile. In both countries, need satisfaction prospectively predicted positive well-being, and in the UK, need frustration prospectively predicted negative well-being. Finally, I found a bi-directional link between total need satisfaction and subjective well-being in both countries. These results point towards a better integration of research into hedonic and eudaimonic well-being. In Paper 3, I showed, both cross-sectionally and longitudinally, that a higher relative importance placed on extrinsic (versus intrinsic) life goals was a negative antecedent of environmentally responsible behaviour, even while controlling for effects of environmental worldviews and environmental identification. Taken together, these results show the negative effects of materialistic

values and life goals in both people's well-being and in the future of our the natural environment.

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## LIST OF ABBREVIATIONS

AI	Aspiration Index
AMOS	Analysis of Moment Structures
CFA	Confirmatory Factor Analysis
CFI	Comparative Fit Index
EFA	Exploratory Factor Analysis
e.g.	For example; abbreviation from the Latin <i>exempli grātiā</i>
E/I	Extrinsic versus intrinsic life goals
GDP	Gross Domestic Product
MVO	Materialistic Values Orientation
MVS	Materialistic Values Scale
OECD	Organisation for Economic Co-operation and Development
PWB	Psychological Well-being
RMSEA	Root Mean Square Error of Approximation
SD	Standard Deviation
SDT	Self-determination Theory
SEM	Structural Equation Modelling
SNDP	The Secretariat for the New Development Paradigm
SWB	Subjective Well-being
UN	United Nations
WHO	World Health Organization
WWF	World Wildlife Fund

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## INTRODUCTION AND LITERATURE REVIEW

### **The State of the World's Well-being: An Urgent Need for a New Model of Development**

The world is making unbelievable economic progress as well as producing incredibly sophisticated technology (Sachs, 2012). Our current model of development has increased income and consumption and created prosperity (SNDP, 2013). However, we are living in times of enormous contradictions, and the world is now at a crossroads (Sachs, 2012; SNDP, 2013). Our current model of development, mainly based on economic growth and income, has reached its limits. The excessive focus on Gross Domestic Product (GDP) and consumption has led the world to unsustainable ecological, social and economic crises. Thus, it has been argued that humanity is currently facing four major challenges:

First, despite the fact that the world has experienced tremendous economic, social and technological development during the last few decades, there was only a small drop in the number of people living in *poverty* between 1981 and 2008. The number of people living on less than US \$2 per day only fell from 2.59 billion to 2.47 billion. Moreover, more than 1 billion people still remain living in *extreme poverty*, surviving on less than US \$1.25 per day (Sachs, 2012; SNDP, 2013; World Bank, 2012a, 2012b).

Second, we live in a world of growing inequalities, both intra-national and international. Research has consistently shown that higher income inequalities are associated with a whole range of health and social problems such as higher rates of homicide, teenage births, obesity and mental illness, as well as lower rates of trust, children's well-being and life expectancies (Wilkinson & Pickett, 2011). Unfortunately, as measured through the Gini Index, the richest 8% of the world's population owns one half of all economic resources, whereas the remaining 92% of the population owns the other half (OECD, 2011a). Moreover, the richest 20% of the world's population consume 86% of its resources, whereas the poorest 20% consume only 1.3% (SNDP, 2013). Notably, these inequalities have remained extremely high and almost unchanged between 1980 and 2010 (Milanovic, 2012).

Third, economic progress and affluence have created their own *disorders*, increasing the prevalence of several mental and physical health problems, such as depression, anxiety and obesity (OECD, 2011b; Sachs, 2012). Currently, depression

affects approximately 350 million people around the world (Marcus, Yasamy, van Ommeren, Chisholm, & Saxena, 2012). Depressive disorders have become the leading cause of disability, and the need for treatments is rising globally (Bromet et al., 2011; The Huffington Post, 2011). Moreover, the overall prevalence of anxiety is shown to be extremely high (Kessler, Ruscio, Shear, & Wittchen, 2010) with lifetime prevalence rates between 13.6% and 28.8% in Western countries (Michael, Zetsche, & Margraf, 2007). Teenagers have been shown to be particularly at risk of having these mental illnesses. A dramatic increase has been observed in the rates of anxiety, depression and behavioural problems in young populations. For example, over the last 30 years, the proportion of 15-16 year olds with frequent symptoms of anxiety or depression has doubled (Nuffield Foundation, 2012). In terms of physical problems, obesity has shown an alarming rise in recent decades, not only in developed countries, but also in developing ones (OECD, 2011b). All of these illnesses and disorders have been attributed to our current model of development (Sachs, 2012).

Fourth, climate change and global warming have become the hardest challenge for the 21<sup>st</sup> century. As stated by the World Bank (2013):

Its effects—higher temperatures, changes in precipitation patterns, rising sea levels, and more frequent weather-related disasters—pose risks for agriculture, food, and water supplies. At stake are recent gains in the fight against poverty, hunger and disease, and the lives and livelihoods of billions of people in developing countries. Addressing climate change requires unprecedented global cooperation across borders.

Overconsumption and overproduction have played a key role in this negative process, causing massive environmental damage, and reducing the potential well-being of future generations (Sachs, 2012).

The above-mentioned four problems are putting at risk the future of all humankind and the Earth. Fortunately, there is a growing consensus on the need and urgency for a new model of development which will help to protect the future of our natural environment, as well as reduce poverty and inequalities, decrease mental and physical health problems and enable people to flourish (Diener, Lucas, Schimmack, & Helliwell, 2009; Seligman, 2011; Stiglitz, Sen, & Fitoussi, 2010; United Nations, 2011).

In fact, as stated by the Secretary-General of the United Nations, “The old model is broken. We need to create a new one. ... It is time to recognize that human capital

and natural capital are every bit as important as financial capital” (Ki-moon, 2012). Further, we need to change our lifestyles in order to move toward a model of Sustainable Development (Sachs, 2012).

Sustainable development is closely linked to the search for happiness (Layard, 2011; Layard, Clark, & Senik, 2012; Sachs, 2012; United Nations, 2011). In fact, there has been a growing consensus that happiness may be part of the solution for the current four dilemmas the world is facing. The link between happiness and sustainable development was demonstrated in a remarkable recent review (Diener & Tay, 2012). Through an extensive review of correlational, longitudinal and experimental studies into the link between subjective well-being – the most universally accepted standard framework for assessing happiness (Diener, 1984, 1994) – and several individual and societal outcomes, the authors concluded that higher levels of happiness lead individuals to become healthier, to live longer, to follow good health practices and to function better. In addition, higher levels of subjective well-being (SWB) would also lead people to become more sociable, friendlier, and more cooperative. Moreover, people scoring higher in SWB would have better social relationships, higher levels of trust and community involvement, and greater willingness to support people in need. Therefore, happier people are more likely to fight harder against poverty and inequalities, to have better physical and mental health and to protect their communities. In addition, individuals higher in SWB tend to report higher environmentally responsible behaviour, which shows that happiness and sustainability may actually be complementary (Brown & Kasser, 2005).

Several well-known institutions have supported these claims (OECD, 2013; Stiglitz et al., 2010; United Nations, 2011). For example, a recent UN General Assembly Resolution (United Nations, 2011) adopted by consensus, and co-sponsored by 68 countries, invited to the governments “to pursue the elaboration of additional measures that better capture the importance of the pursuit of happiness and well-being in development with a view to guiding their public policies” (p.2). Moreover, the Stiglitz Commission, led by two Nobel Laureates in Economics, recommended that the statistical offices of the world should “incorporate questions to capture people’s life evaluations, hedonic experiences and priorities in their own surveys” (Stiglitz et al., 2010, p. 18) in order to advise countries and policy makers.

### **The Rationale for the Present Thesis**



As shown above, the world is facing four serious dilemmas that are putting at risk the future of humankind and the natural environment. Therefore, we urgently need to learn how to tackle these challenges. Fortunately, research has shown that people's happiness may be part of the solution (Diener & Tay, 2012). Therefore, a better understanding of the underlying mechanisms that lead people to be happier and to be more environmentally friendly is a key issue for research and for public policies. This is the main reason why I decided to start the research that is reported in this thesis.

There are several factors that influence happiness and well-being. Among them, values and life goals play a key role (Layard, 2011; Layard et al., 2012). For example, Self-determination Theory (SDT; Deci & Ryan, 2000) states that the relative importance attached to intrinsic (versus extrinsic) values and life goals may play a key role. Intrinsic values (e.g., self-development, community involvement, relatedness) are those values that are pursued because they are intrinsically motivating. In contrast, extrinsic values (e.g., money, fame, image) are those values that are pursued because of external rewards.

A substantive body of research has shown that, other things being equal, a greater relative pursuit of extrinsic values is associated with lower level of happiness and SWB, as well as with higher amount of mental and physical health problems (Dittmar 2008; Dittmar, Bond, Kasser, & Hurst, in press; Kasser & Kanner, 2004). In contrast, a higher relative importance attached to intrinsic values may produce the opposite effect: increase happiness and well-being and protect people's mental health. Moreover, it has been shown that a higher pursuit of intrinsic (versus extrinsic) life goals and values is associated with higher levels of environmentally responsible behaviour (Brown & Kasser, 2005). These are the main reasons why I decided to explore in detail the effects of materialistic and extrinsic (versus intrinsic) life goals on personal well-being, as well as on environmental behaviour. A better understanding of these processes may have at least two positive effects: First, it would be beneficial to increase the scientific knowledge in this area and fill several research gaps still present in the field. Second, this new knowledge may be used by governments and societies to design and implement new public policies aiming to move towards a *sustainable* development model.

## Materialism

Recent research has shown an increase in the desire for money, financial success and material possessions during the last decades. For example, Generation X and Millennials (younger generations) tend to attach a higher relative importance to extrinsic (versus intrinsic) values and life goals than older generations such as Baby Boomers (Twenge, Campbell, & Freeman, 2012). Mass media and advertising have played a key role in this process, showing us every day that money, fame and image are the pathways to happiness and well-being, thus reinforcing the adoption of the *materialistic* values promoted by consumer culture (Dittmar, 2008; Kasser & Kanner, 2004).

Materialism has been always a matter of great interest for people and societies. However, the way that different scientific disciplines have conceptualised this construct tends to differ significantly.

For example, the ancient world used to focus on seeing their negative consequences such as over consumption (Rudmin & Kilbourne, 1996). In fact, the Greek philosophers (especially Pythagoras) “required that students relinquish their personal possessions before entering his school” (Kilbourne, Grünhagen, & Foley, 2005, p. 625).

From a psychological perspective, past work on materialism has operationalized this construct in diverging ways, including personal attitudes and beliefs towards money (e.g., Tang, Kim, & Tang, 2002; Tang, Tang, & Luna-Arocas, 2005); measures of power values (e.g., Schwartz, 1992); and measures of personality traits such as envy, non-generosity and possessiveness linked to material possessions (e.g. Belk, 1985). However, as noted in a recent meta-analysis (Dittmar et al., in press), the most common approaches in recent research have focused on personally internalized materialist values and beliefs (Banerjee & Dittmar, 2008; Richins & Dawson, 1992), and extrinsic (versus intrinsic) life goals and aspirations (Kasser & Ryan, 1993, 1996). These approaches understand materialism as “individual differences in people’s long-term endorsement of values, goals, and beliefs that center on the importance of acquiring money and possessions that convey status” (Dittmar et al. in press, p. 5). Therefore, from these perspectives, materialism would reside at the individual level.

From a philosophical approach, materialism is “a theoretical system where matter is seen as the only reality in the world, as opposed to spiritualism and idealism” (Popkin & Stroll, 1993, cited in Dittmar, 2008, p.74).

From a socio-political perspective, materialistic (or post-materialistic) values are understood as the goals that a society may pursue. For example, Inglehart’s work (Inglehart, 2000, 2008; Inglehart & Baker, 2000) has explored societal values asking people what they think should be the aims of their nation (Kasser, 2002). Such approach assesses the extent to which citizens in a nation care about certain sets of aims, reflecting a particular nation’s orientation towards particular values.

From a sociological perspective, research argues that values (including materialistic values) may reside not only at the individual level, but also at the societal level. That is because “the social environment created by a temporal era shapes individuals similarly to the way geographical areas do” (Twenge & Kasser, 2013, p. 884). In fact, our social environment may influence individuals through “the dominant social ideologies, family structures, economic situations, media, and political and business messages and institutions during the time period in which they live” (Twenge & Kasser, 2013, p. 884). Therefore, individual values are definitely influenced by cultural changes over time (Twenge & Kasser, 2013). Further, materialistic aspirations and goals are a socially constructed phenomenon and its meanings are shared within a society/nation (Dittmar, 2008). Therefore, materialistic values reflect an intimate relationship with consumer goods and aspirations, expressed by both individuals and society (Dittmar, 2008). What happens in cultures, communities and nations – socialising units – clearly influence the values we adopt (Kasser, 2002). Following this reasoning, for some scholars materialism would be the negative consequence of industrialism (Kassiola, 1990, Tawney, 1920), the reason why they have characterised it as the “dark side” of consumption (Kilbourne, Grünhagen, & Foley, 2005).

What the later paragraphs suggest is that materialism is a complex phenomenon that may be understood from multiple perspectives (Kilbourne, Grünhagen, & Foley, 2005).

In my research, following Dittmar et al. (in press), I decided to conceptualise materialism from a psychological approach, measuring it at the individual level — as is presupposed by measuring it at the level of individual differences. I used the current two main approaches to define and measure materialism, the Materialistic Values Orientation informed by consumer psychology (Richins & Dawson, 1992) and the Aspirations Index informed by SDT (Kasser & Ryan, 1993, 1996). Therefore, I understand—and measure—materialism in terms of a personal internalized value system that prioritizes striving for expensive consumer goods, wealth, image, and fame—where wealth is seen as a desirable end in itself, rather than a means to security or survival. Therefore, my focus is on personal, internalized values (i.e. a dimension of individual-level differences) and not on society-level differences in normative beliefs about the goals that a society should pursue (i.e. a dimension of society-level differences). It is important to notice that despite that fact that the scales I used in my research do not directly measure materialism at a societal level, the advantage of my approach is that my scales fully capture the influence of the consumer culture, the shared meaning of materialism, and the differences in the extent to which individuals endorse materialistic values in a nation or in a society (Dittmar, 2008).

**Materialistic values.** The Materialistic Values Orientation conceptualizes materialism as a “set of centrally held beliefs about the importance of possessions in one’s life” (Richins & Dawson, 1992, p. 308). This approach measures materialism through the Materialistic Values Scale (Richins & Dawson, 1992) which is the most widely used materialism instrument in consumer research (Dittmar, 2008). Materialism is conceptualized in terms of three key components: acquisition centrality, success and happiness. According to this perspective, the more people value material rewards as a central life goal and as a pathway for success, happiness and identity, the more materialistic they are (Richins & Dawson, 1992)<sup>1</sup>.

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<sup>1</sup> A possible limitation of the MVS is that the items tend to ask if people would be better off with more money or possessions. This may create bias in the responses of poor and less affluent people. If less affluent people do not have enough money and material resources for living the life they want, this may lead them to agree with the scale items.

**Extrinsic (versus intrinsic) life goals.** The Aspirations Index was developed by Kasser and Ryan (1993, 1996) and is the most influential approach within mainstream personality and social psychology to measure materialism (Dittmar, 2008). Following SDT (Deci & Ryan, 2000), the Aspiration Index assesses the relative importance that a person gives to extrinsic life goals (fame, image and wealth) versus intrinsic ones (self-acceptance, affiliation, community involvement and health). According to this perspective, the higher people rate the *relative* importance of extrinsic life goals, compared to intrinsic life goals, the more materialistic they are.

In my research I decided to use the two most validated and accepted measures of materialism in the field, the AI and the MVS. Both measures are absolute and relative measures for assessing materialistic values. In their meta-analysis, Dittmar et al. (in press) discussed extensively how measuring materialism through an *absolute* measure (e.g. ratings of the importance of money) or a *relative* measure (e.g. assessing how important materialistic goals are in comparison to a variety of other types of goals, such as personal relationships, community involvement, or spirituality) may lead to different results. They consistently found that absolute measures focused on the acquisition of money and possessions alone may not capture the full meaning of materialism. In contrast, they showed that relative goal measures were more strongly related to well-being. Based on these findings, Dittmar et al. (in press) strongly recommended that researchers in the field should employ not only absolute measures (such as the MVS), but also relative measures (such as the AI) in order to capture the full meaning of the construct. That is the main reason why I employed the two scales in my thesis.

### **Well-being**

The study of well-being has been characterized by two traditions: the hedonic approach and the eudaimonic one (Keyes, Shmotkin, & Ryff, 2002).

To date, hedonic well-being theories have formed the more extensively studied approach (Gallagher, Lopez, & Preacher, 2009). The hedonic view defines well-being in terms of attaining pleasure and avoiding pain (Ryan & Deci, 2001). SWB is the most studied construct of hedonic well-being (Ryan & Deci, 2001) and reflects what would normally be called “happiness” in normal daily life (Diener & Tay, 2012). SWB “refers to people’s sense of wellness in their lives, in both thoughts and feelings” (Diener & Tay, 2012, p.1) and includes satisfaction with life as well as higher positive affect and lower negative affect (Diener, 1984, 1994).

However, according the eudaimonic point of view, well-being does not consist only of happiness and pleasure, or the absence of pain. True well-being should reflect the actualization of human potentials, meaning and self-realization (Ryan & Deci, 2001). Following this reasoning, the eudaimonic approach defines well-being in terms of being humanly fully functioning (Ryan & Deci, 2001; Seligman, 2011).

Although the two above-mentioned traditions of well-being research have evolved separately, increasing attention is being given to how both approaches are connected (Keyes et al., 2002). However, to the best of my knowledge, there is no consensus in the literature regarding the causal direction of the link between hedonic and eudaimonic well-being. Therefore, longitudinal designs are needed (Keyes et al., 2002) in order to clarify the causal relationships between the two constructs and thus illuminate the processes underlying the results of numerous previous correlational studies (Gallagher et al., 2009).

### **The Link between Materialism and Well-being**

Although our current consumer culture tells us every day that money, fame and image are the pathways to happiness and well-being (Kasser & Kanner, 2004), several studies have reported a negative link between these two constructs (Kasser, 2002). For example, materialism has been associated with lower positive well-being, indexed as less life satisfaction (e.g., Burroughs & Rindfleisch, 2002; Vansteenkiste, Soenens, & Duriez, 2008), less self-actualization (e.g., Kasser & Ryan, 1993, 1996), less positive affect (e.g., Christopher & Schlenker, 2004), less vitality (e.g., Kasser & Ahuvia, 2002), and less happiness (e.g., Burroughs & Rindfleisch, 2002). Moreover, materialism has also been found to be positively related to ill-being, indexed by higher negative affect (e.g., Christopher, Kuo, Abraham, Noel, & Linz, 2004), higher alcohol and substance use (e.g., Williams, Cox, Hedberg, & Deci, 2000), higher physical symptoms (e.g., Kasser & Ryan, 1996), higher depressive symptoms (e.g., Vansteenkiste, Lens, & Deci, 2006), and higher unhappiness (e.g., Kasser & Ahuvia, 2002). Notably, this negative link between materialism and well-being has been found not only in developed and industrialized countries characterized by a long-established mass consumer society, but also in developing societies (Dittmar et al., in press).

The main theoretical explanation for the negative link between materialism and well-being has been proposed by SDT. According to SDT, a higher pursuit on extrinsic (versus intrinsic) life goals will take time and energy away from fulfilling basic

psychological needs, which in turn may lead people to experience lower well-being (Deci & Ryan, 2000; Kasser, 2002). This hypothesized mediational role has been tested in several correlational studies and explored in detail in a recent meta-analysis (Dittmar et al., in press)<sup>2</sup>.

### **The possible role of basic psychological needs**

*Psychological need satisfaction and well-being.* According to SDT, human beings have three basic psychological needs – *autonomy*, *competence* and *relatedness* – which function as psychological nutrients and enhance well-being. *Autonomy* refers to the feeling that our behaviour is volitional and meaningful; *competence* refers to feeling effective and efficient in our behaviour; and *relatedness* refers to feeling that we are connected through meaningful and intimate relationships to others who are important to us (Reinboth & Duda, 1996; Sheldon & Elliot, 1999; Sheldon & Niemiec, 2006).

SDT argues that, just as plants need essential nutrients – such as water and minerals – for survival and healthy growth, so people need psychological nutrients (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). According to SDT, experiences of autonomy, competence and relatedness would be these key nutrients.

Consistent with SDT, these three needs have been shown to have unique additive effects on personal well-being. These results have been found by using different research designs (Sheldon & Niemiec, 2006). For example, people tend to report more positive affect, less negative affect, and more vitality on days when these

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<sup>2</sup> It is important to mention that several studies suggest that the link between materialism and well-being is not restricted to wealthy samples. For example, in a sample of very poor Chinese rural-to-urban migrant workers, Chen, Van Assche, Vansteenkiste, Soenens, and Beyers (2013) showed that even the attainment of materialistic strivings related negatively to well-being. Yet, in this same poor sample, the experience of financial security, which was argued to stand in the service of basic survival, related positively to well-being. In addition, in a recent meta-analysis across 216 independent samples, Dittmar et al. (in press) found that, although the association between materialism and personal well-being was stronger in wealthier nations, it was not moderated by personal income. I should reiterate that my materialism measures tap into a worldview that material possessions represent a pathway to self-worth, success, and life satisfaction, instead of seeing materialism as a relatively broad cluster of “survival values” some of which may be important for financial security. Thus, the exact meaning attached to financial aspirations may determine their impact on subsequent well-being.

needs are fulfilled (Reis et al., 2000; Ryan, Bernstein, & Brown, 2010; Sheldon, Ryan, & Reis, 1996; Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013), as well as experiencing events that satisfy these needs as more satisfying (Sheldon, Elliot, Kim, & Kasser, 2001; Sheldon & Niemiec, 2006). These results have been obtained in different domains such in sport contexts (e.g., Gagné, Ryan, & Bargmann, 2003; Reinboth & Duda, 2006), in law schools (Sheldon & Krieguer, 2007), in the health domain (Williams, McGregor, Zeldman, Freedman, & Deci, 2004), in the workplace (Ryan et al., 2010; Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010), and in the education field (e.g., Vlachopoulos, Katartzi, & Kontou, 2011), as well across the life span (Kasser & Ryan, 1999; Niemiec, Lynch, Vansteenkiste, Bernstein, Deci, & Ryan, 2006). Notably, the link between need satisfaction and well-being has been found in several different cultures (e.g., Chirkov, Ryan, & Willness, 2005; Deci, Ryan, Gagné, Leone, Usunov, & Kornazheva, 2001; Sheldon et al., 2001; Taylor & Lonsdale, 2010).

Despite the substantial amount of research showing the link between need satisfaction and well-being, previous studies still present the following research gaps: First, the great majority of previous studies have employed correlational designs, which do not allow inferences about cause-effect relations. Only a few studies have tried to tackle this important problem through longitudinal designs, but most of these have still not used designs that are sensitive to establishing causal precedence. Second, almost all previous longitudinal studies used students and other young people in the Western world. To the best of my knowledge, there are no previous longitudinal studies exploring the link between need satisfaction and well-being in non-Western countries. Third, most of the studies have assessed only a few measures of well-being, and to the best of my knowledge, there are no comprehensive models exploring longitudinally how both hedonic and eudaimonic well-being are related. Fourth, and finally, according to Sheldon and Hilpert (2012), an appropriate need satisfaction scale needs to be balanced in terms of the number of questions for each of the three needs, as well as requiring the inclusion of a similar number of satisfaction and frustration items; yet in most of the previous studies, need-satisfaction has been measured in a variety of different ways and contexts without paying attention to the methodological shortcomings.

***The additional role played by need frustration.*** Over the last few years, some scholars have argued that people's tendencies towards both well-being and ill-being may not be explained by basic psychological need satisfaction alone. Importantly,



research has shown that need satisfaction and need frustration represent distinct factors (Cordeiro, Paixão, Lenes, & Silva, 2013; Sheldon, 2011; Sheldon, Abad, & Hinsch, 2011; Sheldon & Gunz, 2009; Sheldon & Hilpert, 2012). Therefore, need *frustration* could also play a key role in this process, because the lack of need fulfilment may differ from need frustration (Vansteenkiste & Ryan, 2013). Need frustration implies that the satisfaction of needs is blocked due to an active obstruction of the psychological needs. Therefore, it seems that whereas need satisfaction may predict positive well-being, it does not always predict negative well-being.

Hence, increasing empirical attention has been given recently to exploring the additional role that need frustration may play (Vansteenkiste & Ryan, 2013). For example, Sheldon and Gunz (2009) explored need satisfaction and need frustration in relation to need-relevant motivations. The authors found that the frustration of the psychological needs is associated with a higher desire to reduce need frustration, but that need satisfaction is not related to the desire to satisfy the needs. Sheldon et al. (2011) studied the association between the use of Facebook, and the satisfaction and dissatisfaction of the basic psychological needs. It was found that more frequent Facebook usage correlated with more relatedness satisfaction and with more relatedness frustration. Sheldon (2011) explored the role of need satisfaction and need frustration on the behavioural-motive and experiential-reward aspects of needs. The authors found that need satisfaction and need frustration tap into two different constructs and correspond to the separable behavioural-motive and experiential-reward aspects of needs. Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani (2011) found that need satisfaction related especially to positive outcomes whereas need frustration related to maladaptive ones. Stebbings, Taylor, Spray, & Ntoumanis (2012) replicated these findings among sports coaches. Employing an objective marker of psychobiological functioning, Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, (2011) found that need frustration (but not need satisfaction) was related to higher levels of immunological problems. Verstuyf, Vansteenkiste, and Soenens (2012) showed that need frustration could account for the link between dieting to achieve physical attractiveness and bulimic symptoms. Finally, Verstuyf et al. (2013) showed that the daily fluctuation in psychological need frustration but not in need satisfaction was associated with daily variation in negative well-being (assessed in terms of bulimic symptoms), but not with positive outcomes.

Thus, this still small but growing body of literature seems to show that need

satisfaction would be associated with more positive outcomes and need frustration with more negative outcomes (Verstuyf et al., 2013). However, to the best of my knowledge, there are no longitudinal studies exploring the unique and differential roles played by both need satisfaction and need frustration in positive and negative well-being.

### **Can Psychological Needs Explain the Link between Materialism and Well-Being?**

As mentioned previously, one of the most prominent theoretical explanations for the negative link between materialism and well-being has been developed by SDT through the hypothesized mediation of the three basic psychological needs. For example, Kasser and Ryan (1993, 1996) distinguished between intrinsic aspirations (e.g., affiliation, personal growth, community contribution and health) and extrinsic aspirations (e.g., wealth, fame, and image), proposing that a higher relative pursuit of intrinsic goals helps to fulfill the three intrinsic needs and thus increases individuals' well-being, whereas a higher relative pursuit of external goals undermines people's happiness and well-being. Furthermore, seeking relatively more extrinsic than intrinsic rewards takes time and energy away from fulfilling basic needs, leading to lower personal well-being (Dittmar, 2008). Thus, whereas intrinsic goal pursuit may relate to greater opportunities for need satisfaction, the pursuit of extrinsic goals may interfere with need satisfaction and even elicit experiences of need frustration.

A few previous studies have explored the potential mediating role of basic psychological need satisfaction in the link between intrinsic (versus extrinsic) goals and well-being, but only in specific life domains such as work, eating regulation, and sports (Sebire, Standage, & Vansteenkiste, 2009). Nonetheless, there are still four important gaps in the research in this field. First, previous studies on materialism, need satisfaction and well-being have failed to take the potential mediational role of need frustration explicitly into account. Second, all the studies presented above were grounded in the SDT tradition, and thus were limited by relying on intrinsic-extrinsic goal measures. Further on this point, it would be important to explore whether need satisfaction and need frustration can also account for the link between scores on the Materialistic Values Scale and well-being. Third, most of the studies have been focused on specific contexts (e.g., work, sports, eating behaviour). Indeed, it remains to be demonstrated whether need satisfaction and need frustration can account for the materialism – well-being association in more general terms. Fourth, there is a lack of

research into these constructs and processes in South American countries (Dittmar et al., in press).

### **Alternative Explanations of the Link between Materialism and Well-being**

Although higher materialism may produce lower well-being due to the mediating role of need satisfaction and need frustration (Deci & Ryan, 2000; Kasser & Ryan, 1993, 1996), it is also possible that unhappy people may seek extrinsic rewards in order to improve and overcome their problems (Dittmar, 2008). For example, Terror Management Theory states that, when people are reminded of their own mortality, they often seek out mechanisms for enhancing their self-esteem (Solomon, Greenberg, & Pyszczynski, 1991). As a result of this threat, a common strategy for self-protection may be to endorse self-enhancing, materialistic values (Crompton & Kasser, 2009). Following these arguments, Sheldon & Kasser (2008) have found that *psychological threats* do increase the search for extrinsic life goals, which in turn negatively affect people's well-being. In other words, when people's well-being is diminished, a strategy could be to engage in a materialistic value orientation.

### **Understanding Environmental Behaviour**

In recent years, social psychologists have tried to understand the determinants of environmental behaviour (Bamberg & Möser, 2007). Among the most important factors, research has consistently shown that a pro-environmental worldview is a good predictor (Gatersleben, Murtagh, & Abrahamse, 2012; Gatersleben, White, Abrahamse, Jackson, & Uzzell, 2010; Steg & Vlek, 2009). These findings have been confirmed through meta-analyses (Bamberg & Möser, 2007; Hines, Hungerford, & Tomera, 1987) and longitudinal research (Kaiser, Wölfling, & Fuhrer, 1999).

Recently, it has been also stated that *social identification* processes may play a key role in people's environmental behaviour. Social identity refers to the groups to which a person feels she/he belongs to. It includes, for example, membership of particular groups based on gender, race, nationality, profession or religion (Tajfel and Turner, 1986). The idea of social identification has been expanded to consider people's sense of belonging to the non-human environment (Crompton & Kasser, 2009). As a result, the concept of *environmental identification* – an example of an extended self – has emerged, reflecting a person's sense of connection to nature that affects the ways in which he/she acts and perceives the world (Clayton, 2003).

Researchers have shown that the ways in which people perceive the natural world (Crompton & Kasser, 2009) may relate to environmental behavior (Gatersleben, Murtagh, et al., 2012; Nigbur, Lyons, & Uzzell, 2010; Whitmarsh & O'Neill, 2010). For example, for people with a high degree of inclusion of the environment in their self, nature has inherent value because it is interconnected with their identities (Schultz, 2001). This kind of people tends to behave more environmentally friendly. Research has supported these claims, showing that environmental identification may be positively correlated with different types of pro-environmental behaviour, such as waste, transport and buying behaviours (Gatersleben, Murtagh, et al., 2012) helping people to develop a close relationship with the environment (Schultz, 2000).

It is important to notice that there is a growing interest in the study of a “connection to, engagement with, or identification with the natural environment” due its beneficial impact upon the natural environment (Sparks, Hinds, Curnock, & Pavey, 2014, p. 167). However, as a consequence of this growing interest in the field – which has produced several important research findings – psychology and sociology has an enormous variety of measures assessing connection, engagement and identity (see Sparks et al. 2014 for a revision).

For example, Mayer and Frantz (2004) assessed *connectedness to nature* and developed *The Connectedness to Nature Scale* as a measure of an “affective, experiential relationship to the natural world” (Mayer & Frantz, 2004, p. 504). Nisbet, Zelenski and Murphy (2009) assessed *nature relatedness* and created the *Nature Relatedness Scale*. Schultz (2002) developed the *Inclusion of Nature in Self*. Stets and Biga (2003) assessed environment identification, but state that this measure should include a *sense of connection* as part of it. Finally, Hinds and Sparks (2008) used an environmental identity scale to assess some kind of identification with the natural environment.

These different conceptualisations and measures (among others) have led to some degree of confusion when researchers have tried to explore environmental identification. Social psychology has tried to solve these problems and ambiguities, but it has not always been successful. For example, there is some evidence showing that environment-related identities are significantly associated with *affective* connections to the natural environment (Hinds & Sparks, 2008). Further, it is possible to expect the inclusion of nature within people’s *cognitive* representations of the self (Hinds & Sparks, 2009). That is because people will identify with what they care about (Hinds & Sparks,

2009). Thus, an important question arises: to what extent should a measure of environmental identification include both emotional and cognitive dimensions? There is no final answer in the field. For instance, *The Connectedness to Nature Scale* is a measure of affective and experiential measure whereas the *Inclusion of Nature in Self* (Schultz, 2002) is a more cognitive construct (Sparks et al., 2014).

Another ambiguity in terms of the environmental identification scales relates to what extent the measures should reflect either strong social associations with nature (such as actively participating with environmental groups and communities) or higher individual emotional connections with the natural environment, but with minimal social engagement (Hinds & Sparks, 2008).

Therefore, because there is a variety of means by which *identification with the natural environment* may be conceptualised and measured, the approach that a particular study adopts is a key issue for understanding the research findings. In my thesis, I decided to use Hinds and Sparks' (2008) scale which reflects a more personal than social form of identification with the natural environment.

Importantly, recent research has suggested that values and life goals might also play an important role in environmental behaviour, because they reflect what people think it is desirable and important in their lives (Schwartz, 1992, 2006). Values and life goals are high order cognitions that influence our attitudes, as well as high order motivations that drive our behaviours (Crompton & Kasser, 2009).

Schwartz's (1992, 2006) circumplex model of values may help to understand the relationship between materialistic values, and life goals and environmental behaviour. The author found that human values can be grouped into 10 motivational domains and two dimensions. The 10 types of values (domains), which consistently emerged across nations and express different motivational goals were: benevolence, universalism, self-direction, stimulation, hedonism, achievement, power, security, conformity and tradition. The two dimensions which emerged cross-culturally were self-enhancement (e.g., power) versus self-transcendence (e.g., universalism) and openness to change (e.g., tradition) versus conservatism. self-enhancement versus self-transcendence and conservation versus openness to change (e.g., stimulation).

Among the later dimension, a set of self-enhancing, materialistic values (e.g., power and achievement), emerged across cultures as opposed to a set of self-

transcendent values (e.g. universalism and benevolence). It was also found that these different types of values are dynamically related. Strongly pursuing self-enhancing, materialistic values tends to conflict with universalism and benevolence values and vice versa. For example, the values *unity with nature*, *protecting the environment* and *a world of beauty* emerged consistently in the universalism region, which was opposed to the power and achievement region.

Drawing on Schwartz's classification of human values (1992), Stern & Dietz (1994) developed a value-basis theory to study the relationship between values and environmental concern, attitudes and behaviour. The authors suggested that three values underlie environmental concern: egoism, altruism and biospherism (Gatersleben, Murtagh, & Abrahamse, 2012). Thus, people would value the environment because of three motives: an egoistic concern (focus on the individual); a social-altruistic concern (concern for all people); and a biospheric concern (awareness for all living species).

Several papers have used Stern & Dietz's classification (1994). For example, Schultz (2001) found in a sample of US students, that self-enhancement, materialistic values were positively associated with egoistic concerns and negatively with altruistic and biospheric concerns. Self-transcendent values showed the opposite pattern. Moreover, De Groot and Steg (2008) measured these three value orientations through a short scale created for the authors (Gatersleben, Murtagh, & Abrahamse, 2012). The authors found that, for example, biospherism and altruism are positively related to environmental concern and behaviour (De Groot and Steg, 2008; Gatersleben, White, Abrahamse, Jackson, & Uzzell, 2009).

In cross cultural research, drawing on Schwartz higher order value structures, Schultz et al. (2005) found a significant and negative association between biospheric concerns and self-enhancement, materialistic values among university students. Egoistic concern showed the opposite associations.

Additional kinds of values relevant to pro-environmental behaviour are materialistic values (Gatersleben, Murtagh, & Abrahamse, 2012). Research has found negative associations between these constructs (e.g. Brown & Kasser, 2005; Gatersleben et al., 2010). For example, different studies have found that pro-environmental behaviour is positively associated with self-transcendent values (e.g., De Groot and Steg 2008) whereas materialism is positively related to self-enhancement (e.g., Richins 2004). Thus, it seems that pro-environmental behaviour is motivated by

concern for others (and the natural world), rather than for selfish concern (Gatersleben, Jackson, Meadows, Soto, & Yan, 2012).

Following Schwartz (1992), the hypothesis that materialism and pro-environmental behaviour are opposites is based on the assumption that both are often inversely related to the same values. In support of this claim, a few studies have shown that materialism is positively related to self-enhancement values whereas pro-environmental behaviour is related to self-transcendence values (Stern and Dietz, 1994; Schultz and Zelezny, 1999). Moreover, Richins (2004) found positive associations between materialism and self-enhancement values such as power and achievement, and negative associations between materialism and self-transcendence values such as universalism and benevolence (Gatersleben, White, Abrahamse, Jackson, & Uzzell, 2010). Following these ideas, De Groot and Steg (2008) found that egoism is negatively related to pro-environmental behaviour whereas the opposite happens regarding biospherism (Gatersleben, White, Abrahamse, Jackson, & Uzzell, 2010).

To sum up, research has shown that values are associated with environmental behaviour. However, the former approaches present two important limitations. First, the main explanations about the negative associations between materialistic values and environmental behaviour are often based on either Schwartz's (1992) work on general values (Gatersleben, White, Abrahamse, Jackson, & Uzzell, 2010) or on Stern and Dietz's (1994) underlying dimensions of environmental concern. However, Schwartz (1992) and Stern and Dietz (1994) did not measure materialism directly, because they assessed general values instead of more specific values. Researchers have tended to classify power and achievement as "materialistic values", but they are not the same. Second, Schwartz (1992) and Stern and Dietz's (1994) measures were not designed to capture the influences of our current consumer culture on the environment, which is an important element to study. Further, little research has been carried out on materialism literature using either the MVS or the AI scales from a social psychological approach, and from directly measuring the construct. Therefore, measuring materialistic values at the individual level from these theoretical approaches – which fully captures the influence of consumer culture – will help us to a better understanding of the underlying mechanism behind environmental behaviour. My research aims to tackle these research gaps.

Therefore, following Schwartz's (1992, 2006) ideas, it seems likely that people who strongly endorse self-enhancing, materialistic values and life goals may tend to

present lower pro-environmental worldviews and more ecologically unfriendly behaviour towards non-human nature. However, just some few studies have supported these claims from the materialism perspective. For instance, Richins & Dawson (1992) found that more materialistic people tend to be less likely to buy used goods, to use bicycles instead of cars, or to recycle or help ecological organizations. Gatersleben, White, Abrahamse, Jackson, & Uzzell (2009) found that people scoring higher in materialism attached less importance to energy-conserving processes, and showed less willingness to change a diverse range of ecologically irresponsible behaviours. Brown & Kasser (2005) found that ecologically responsible behaviour was positively associated with an intrinsic (versus extrinsic) value orientation. Sheldon & McGregor (2000) found that more extrinsically oriented individuals tend to consume limited ecological resources at more unsustainable rates. Banerjee & McKeage (1994) found that environmentally-friendly consumption was negatively related to materialism.

Therefore, it seems that people who attach a higher importance to intrinsic values and life goals may tend to engage in less damaging environmental behaviour (Banerjee & McKeage, 2004; Brown & Kasser, 2005; Richins & Dawson, 1992; Sheldon & McGregor, 2000). This may be because people focused on intrinsic goals (which are intrinsically rewarding according to SDT), do not need a high amount of external rewards (such as high levels of consumption), to fulfill their physical and psychological needs (Brown & Kasser, 2005; Hurst, Dittmar, Bond, & Kasser, *in press*).

Previous findings have been confirmed in a recent meta-analysis (Hurst et al., *in press*). However, there are still three important additional limitations in the field. First, the existing evidence has been limited to a relatively small number of cross-sectional studies, and it remains unclear to what extent intrinsic (versus extrinsic) life goals are causally implicated in environmentally responsible behaviour. Therefore, there is an urgent need for systematic longitudinal research to disentangle the causal relationship between people's life goals and their everyday behaviour. Second, although research has suggested that environmental behaviour may be affected by life goals, environmental worldviews and environmental identification, these variables have never been studied together (Gatersleben, Murtagh, et al., 2012). Therefore, we know little about their combined impact on environmental behaviour, nor how these variable are related to each other. Crucially, it seems important to know whether life goals add variance to predictions of environmentally responsible behaviour, over and above the possible effects of these other predictors. Third, most of the research so far has been



conducted among students and other young people in Western nations. To date, there has still been very little research among adult samples, and, according to my knowledge, all published research studying this link has been conducted only in Western nations, which are a very small part of the world's population (United Nations Development Programme, 2010).

### **Overview of the Research**

I have described how materialistic values and life goals are thought to be related to need satisfaction and need frustration, as well as to personal well-being and environmental behaviour. I decided to extend and empirically test some of the main theoretical ideas reviewed above, by means of a large-scale longitudinal on-line research project (see Appendix 1 for questionnaires) conducted over the last three years among adult participants in the UK and Chile. Selected results are presented here as three separate papers.

I tested the main hypotheses both correlationally and longitudinally among samples of adult university graduates from two different cultures: one established mass consumer society (the UK) and one fast-growing new economy (Chile). The data were obtained from a three-wave longitudinal survey (T1 = 2010, T2 = 2011 and T3 = 2012). Among the British sample, 461 adults (48.12% of time 1; 59% female) ranging in age from 20 to 77 years (Mean = 45.14; *SD* = 14.06) completed all 3 waves. Nine-hundred and fifty eight UK participants completed Wave 1, 554 completed Wave 2, and 610 completed Wave 3. Among the Chilean sample, seventy-six adults (29.6% of time 1; 47% female) ranging in age from 22 to 71 years (Mean = 36.87; *SD* = 10.21) completed all 3 waves. Two hundred and fifty seven participants completed Wave 1, 115 completed Wave 2 and one 114 completed Wave 3.

In Paper 1, I investigated the correlational associations between materialism, need satisfaction, need frustration and well-being at T1. Structural Equation Modelling analyses allowed me to complement previous findings into the link between materialism and well-being in the following ways. First, I found that a stronger materialistic value orientation was associated with lower levels of positive psychological well-being, as well as with higher levels of negative well-being. These findings replicated earlier ones and extended the results to Chile, a country which has never been studied before from this perspective. Second, I found that both need satisfaction and need frustration mediated the link between materialism and well-being. Moreover, need frustration

played an incremental explanatory role, above and beyond the role of need satisfaction. Therefore, these findings support recent claims stating that low need satisfaction may be different from need frustration (Vansteenkiste & Ryan, 2013). Third, I demonstrated that the negative link between materialism and well-being and the mediation of this link by need satisfaction and need frustration did not differ, in general, across the two national contexts, thus providing supportive evidence for the cross-cultural generality of these mechanisms proposed within the SDT perspective.

The most prominent theoretical explanations for the negative link between materialism and well-being has been developed by SDT through the hypothesized mediation of the three basic psychological needs. However, most of previous studies on the link between need satisfaction and well-being have employed correlational designs, which do not allow inferences about cause-effect relations. Only a few studies have tried to tackle this important problem through longitudinal designs, but most of these have still not used designs that are sensitive to establishing causal precedence. Therefore, studying the correct direction of this link is a key issue for understanding the possible mediation role played by need satisfaction in the link between materialism and well-being. Paper 2 approach this issue and focused in more detail on one part of the broader structural model tested in Paper 1—namely the relationship between basic psychological needs and well-being.

In Paper 2, I aimed to explore longitudinally the above-mentioned hypothesized link between need satisfaction and well-being, overcoming the above-mentioned limitations still present in the SDT field. Using data from all three time points, I extended previous research on the causal link between need satisfaction and well-being employing cross-lagged longitudinal models. Moreover, using a balanced need satisfaction/need frustration scale, I explored longitudinally the differential roles played by both need satisfaction and need frustration in predicting positive and negative well-being. Paper 2 results showed that in both countries, total need satisfaction was a positive prospective predictor of well-being. Moreover, in the UK, higher well-being was a positive prospective predictor of total need satisfaction. When we split need satisfaction in its three needs, only relatedness reached statistical significance in the UK. In Chile, none of the three needs was an individually significant prospective predictor of well-being. We also found that need satisfaction was a significant prospective predictor of positive well-being in both countries, whereas need frustration was a significant prospective predictor of negative well-being in the UK. Finally, we found a bi-

directional positive link between need satisfaction and subjective well-being. Our results point towards a better integration of research into hedonic and eudaimonic well-being.

In Paper 3, I explored whether intrinsic (versus extrinsic) life goals would predict environmentally responsible behaviour among graduate adults in the UK and Chile. I used both cross-sectional analyses of T1 data (Study 1) and longitudinal analyses of data from all three waves (Study 2), in order to provide evidence for the causal direction of the relationships observed. In Study 1, Structural Equation Modelling analyses showed that in both countries more extrinsically-oriented people tended to show lower levels of environmentally responsible behaviour. Importantly, these relationships were found while controlling for the effects of environmental worldviews and environmental identification. In Study 2, using cross-lagged models, I extended previous research by showing that a higher relative importance placed on external (versus intrinsic) rewards was a negative antecedent of environmentally responsible behaviour. Importantly, this predictive effect was found while controlling again for the effects of environmental worldviews and environmental identification. Similar results were found in both samples, thus suggesting that the negative environmental consequences of attaching a higher importance to material and external rewards are not limited to Western nations.

**PAPER 1: Materialism and Well-being in the UK and Chile: Basic Need Satisfaction and Basic Need Frustration as Underlying Psychological Processes**

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### Abstract

A growing body of evidence shows that materialistic values are linked to lower well-being. Self-Determination Theory offers an explanation through the low fulfilment of the basic psychological needs for autonomy, competence, and relatedness. However, recent research suggests that frustration of these psychological needs may also play an additional role. Using Structural Equation Modelling in adult samples from an established mass consumer society (UK:  $N = 958$ ) and a fast-developing new economy (Chile:  $N = 257$ ), and employing more comprehensive measures to tap into a materialistic orientation than used in previous studies, we demonstrated that a materialistic value orientation related negatively to well-being and positively to ill-being and that both psychological need satisfaction and psychological need frustration played an explanatory role herein. The model was found to be highly equivalent across both samples supporting the cross-cultural generality of the mechanisms central to Self-Determination Theory.

### Introduction

The endorsement of materialistic values in contemporary consumer cultures refers to the “the ownership and acquisition of material goods in achieving major life goals” (Richins, 2004, p. 210). Although the acquisition of more money and material goods is presented as a route to a successful and satisfying life, a growing body of research indicates that a materialistic value orientation associates negatively with well-being (Dittmar, 2008; Kasser & Ahuvia, 2002; Kasser & Kanner, 2004). Materialistic values are known to be prevalent in developed and industrialized countries characterized by a long-established mass consumer society (e.g., UK, US). Yet, recent research has begun to document their prevalence in developing countries as well (Dittmar & Kapur, 2011). The current contribution aims to test the role of the *satisfaction* and *frustration* of the basic psychological needs for autonomy, competence, and relatedness, as conceived within Self-Determination Theory (SDT; Deci & Ryan, 2000), to account for the relationship between materialistic values and both well-being and ill-being among adults from two fairly different societal contexts: that is, an established mass consumer society (i.e., the UK) and a fast developing new economy (i.e., Chile).

## **Materialistic Values and Well-being**

Following initial work on materialism which conceptualized it as a triad of personality traits (i.e., envy, non-generosity, and possessiveness; Belk, 1985), contemporary research has focused on aspirations or values (Banerjee & Dittmar, 2008). There are two main approaches to define and measure materialistic values: the Materialistic Values Scale informed by consumer psychology (Richins & Dawson, 1992) and the Aspirations Index informed by SDT (Kasser & Ryan, 1993; Vansteenkiste, Soenens, & Duriez, 2008). The Materialistic Values Scale, widely used in consumer research, measures three key components: that is, acquisition centrality, success, and happiness. According to this perspective, the more people value material rewards as a central life goal, see them as a key route to achieve success and happiness, and use them to define their identities, the more materialistic they are (Richins & Dawson, 1992). The Aspirations Index (Kasser & Ryan, 1993, 1996), which has been more influential within mainstream personality and social psychology, assesses the importance a person places on extrinsic life goals (e.g., fame, image, and wealth), compared to intrinsic life goals (e.g., self-acceptance, affiliation, community involvement, and health). According to this perspective, the higher people rate the importance of extrinsic goals in comparison to intrinsic goals, the more materialistic they are. Thus, this measure assesses the relative importance of a materialistic value orientation in a person's overall value system, whereas the Materialistic Values Scale measures the endorsement of a materialistic value orientation as such (Dittmar, 2008).

According to both perspectives, materialism is a value system at the heart of consumer culture, which places strong emphasis on the acquisition of money, fame, success and image, and which portrays a materialistic lifestyle as the ideal pathway to happiness and well-being (Kasser, 2002; Richins, 2004; Richins & Dawson, 1992). Recent research (Twenge, Campbell, & Freeman, 2012) indicates that younger generations (i.e., generation X and Y) have adopted more strongly this value orientation than older generations (i.e., Babyboomers), and the mass media has presumably played a crucial role herein. From early childhood, people receive messages about the value of pursuing money, fame and success, reinforcing the adoption of the ideals promoted by consumer culture (Dittmar, 2008). Although the pursuit of materialism is portrayed as promising, numerous studies have reported a negative link between materialism and well-being, as indexed by less life satisfaction (e.g., Burroughs & Rindfleisch, 2002,

Vansteenkiste, Soenens, & Duriez, 2008), less self-actualization (e.g., Kasser & Ryan, 1993, 1996), less positive affect (e.g., Christopher, & Schlenker, 2004), less vitality (e.g., Kasser & Ahuvia, 2002), and less happiness (e.g., Burroughs & Rindfleisch, 2002). Apart from relating negatively to well-being, materialism has been found to relate positively to various indicators of ill-being, including negative affect (e.g., Christopher, Kuo, Abraham, Noel, & Linz, 2004), alcohol and substance use (e.g., Williams, Cox, Hedberg, & Deci, 2000), physical symptoms (e.g., Kasser & Ryan, 1996), depressive symptoms (e.g., Vansteenkiste, Vansteenkiste, Lens, & Deci, 2006), and unhappiness (e.g., Kasser & Ahuvia, 2002). This pattern of correlates has been further confirmed in a recent meta-analysis (Dittmar et al., in press). Yet, it is striking that most of the included samples in the meta-analysis came from the developed world, leaving the question open whether the effects of materialism generalize to developing countries.

For this contribution, we collected data among adults in the UK and in Chile, which represents an interesting case to be studied. The UK and Chile vary in a number of respects (e.g., geography, economic wealth, and consumer culture penetration; United Nations Development Programme, 2010), providing an initial opportunity to test our hypothesized associations in a developing nation and to compare with an established mass consumer society (Grouzet et al., 2005). As such, we could examine whether the hypothesized correlates of materialism would generalize to Chile. This is a critical issue, as recent cross-national evidence (Gatersleben, Jackson, Meadows, Soto, & Yan, 2012; Schaefer, Hermans, & Parker, 2004) suggests that materialistic values may yield a different pattern of correlates across cultures. For instance, Gatersleben et al. (2012) studied to what extent materialism was associated with different environmental outcomes among 16-25 year olds in the UK, Spain and China. Despite the fact that the results were fairly similar in the UK and Spain, they were quite different for Chinese young adults. Such findings raise the question whether the adoption of materialistic values may yield the same results in the UK and Chile, for example in terms of maladjustments and non-optimal functioning. In fact, it could be argued that pursuit of materialistic ideals does not so much involve acquiring fame and prestige or boosting one's ego in Chile, but stands more in the service of basic survival, thereby allowing one to sustain one's family and daily living. Consistent with this argument, Grouzet et al. (2005) showed that the pursuit of financial success was somewhat more closely aligned with physical needs in developing compared to rich countries. Yet, there are, to the best of our knowledge, no cross-national studies on materialism available that

examine deeply whether materialism yields the same well-being correlates in developing and non-developing countries.

A second lacuna in the present materialism literature is that it is not well understood yet why materialism relates to ill-being. Therefore, grounded in SDT and more specifically in Goal-Content Theory, one of SDT's five mini-theories (Deci & Ryan, 2000; Ryan & Deci, 2000; Vansteenkiste, Niemiec, & Soenens, 2010), we examined whether the satisfaction and frustration of the psychological needs for autonomy, competence, and relatedness would intervene in this link.

### **Psychological Need Satisfaction and Psychological Need Frustration**

Within SDT (Deci & Ryan, 2000), it is maintained that human beings' growth and well-being is fostered by the satisfaction of basic psychological needs for autonomy, competence, and relatedness. Autonomy refers to the need to choose one's own life direction and to experience a sense of psychological freedom in one's behaviour; competence refers to the need to reach one's goals and to effectively carry out one's daily activities; relatedness refers to the need to develop intimate and close relationships with others and to feel part of a group. In line with this claim, previous studies have shown that the fulfilment of these psychological needs relates to well-being (Deci & Ryan, 2000; Vansteenkiste et al., 2010).

More recently, increasing empirical attention (e.g., Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani, 2011) has been devoted to the topic of need *frustration* as the relation between need satisfaction and need frustration is said to be asymmetrical (Vansteenkiste & Ryan, 2013). That is, although the lack of need fulfilment does not necessarily entail the experience of need frustration, need frustration by definition implies that the fulfilment of the needs gets blocked. To illustrate, when an employee does not feel very connected to his colleagues, this does not imply he feels excluded by them. Yet, when he is excluded from a social event or meeting, his psychological needs get frustrated. Thus, different from low need fulfilment, need frustration involves the more active obstruction of the psychological needs. Whereas need satisfaction would especially be critical for growth to take place, need frustration would awaken our vulnerabilities and relate to maladjustment (Vansteenkiste & Ryan, 2013). Past research has shown that need satisfaction and need frustration represent distinct factors (e.g., Sheldon & Gunz, 2009). Further, in line with this distinction, Bartholomew et al. (2011) showed that need satisfaction related especially to positive



outcomes (i.e., vitality, positive affect), whereas need frustration related to maladaptive outcomes (i.e., burnout, disordered eating). Next, Verstuyf, Vansteenkiste, and Soenens (2012) showed that the daily fluctuation in psychological need frustration (and not need satisfaction) related to daily variation in bulimic symptoms.

These psychological needs are thought to intervene in the materialism – well-being association. Indeed, Kasser and Ryan (1993, 1996) argued that the pursuit of intrinsic, relative to more extrinsic and materialistic, goals would help to fulfil the three basic needs, thereby promoting individuals' well-being. That is, being focused on intrinsic aspirations such as helping others in need, building good bonds, or developing one's skills, promotes greater task absorption which, in turn, facilitates greater skill development (Mouratidis, Vansteenkiste, Lens, Michou, & Soenens, 2013; Vansteenkiste, Simons, Lens, Soenens, Matos, & Lacante, 2004). In contrast, the pursuit of extrinsic goals prompts the engagement in social comparison processes, which can be stressful and socially alienating (Banarjee & Dittmar, 2008). Thus, whereas intrinsic goal pursuit may relate to greater opportunities for need satisfaction, the pursuit of extrinsic goals may interfere with need satisfaction and even elicit experiences of need frustration.

A few previous studies have explored the potential mediating role of basic psychological need satisfaction in the link between intrinsic (versus extrinsic) goals and well-being, in specific life domains such as work (Vansteenkiste, Neyrinck, Niemiec, Soenens, Witte, & Broeck, 2007); eating regulation (Thøgersen-Ntoumani, Ntoumanis, & Nikitaras, 2010; Verstuyf et al., 2012); and sports (Sebire, Standage, & Vansteenkiste, 2009). For example, Vansteenkiste et al. (2007) found that a higher intrinsic (versus extrinsic) work value orientation was associated positively with well-being, due to the fulfilment of psychological needs. In the exercise domain, Sebire et al. (2009) found that need satisfaction could partially account for the relation between intrinsic (versus extrinsic) exercise goals and psychological well-being. In addition, Thøgersen-Ntoumani et al. (2010) found that a higher focus on intrinsic goals such as health and image was associated positively with basic need satisfaction, which in turn, was negatively associated with unhealthy weight-management behaviours.

The present study aimed to extend this small body of literature in four ways. Past work on intrinsic and extrinsic goal-contents and needs failed to take explicitly the role of need frustration into account, as the items used to assess need satisfaction tapped into the experience of low satisfaction (e.g., "I often do not feel very capable") rather

than the experience of active need frustration (e.g., “I often experience some kind of failure”). Therefore, the present research examined the unique roles of psychological need satisfaction and need frustration in the relation between intrinsic, relative to extrinsic, aspirations and both well-being and ill-being. Preliminary evidence for the role of need frustration was provided by Verstuyf et al. (2012), who showed that need frustration could account for the link between dieting to achieve physical attractiveness and bulimic symptoms. Yet, these authors did not assess need satisfaction, leaving open the question whether both need satisfaction and need frustration play a critical role.

Second, all studies presented above were grounded in the SDT-tradition, thus being limited by relying on intrinsic-extrinsic goal measures. Yet, it seems important to explore whether need satisfaction and need frustration can also account for the link between materialistic values or beliefs and well-being. Further, we believe it is unfortunate that the fields of materialism and SDT have been developed fairly independently in spite of their clear points of convergence. Only one previous study known to us (Van Hiel, Cornelis, & Roets, 2010) has attempted to bridge this gap, tapping into both adolescents’ materialistic value orientation (Richins & Dawson, 1992) as well as their intrinsic and extrinsic aspirations (Kasser & Ryan, 1993, 1996).

A third novel aspect is that the present study focused on participants’ aspirations and materialistic strivings in their lives in general rather than vis-a-vis specific contexts (work, sports, eating behaviour), as was the case in the previously mentioned studies. Indeed, it remains to be demonstrated whether need satisfaction and need frustration can account for the materialism – well-being association in more general terms.

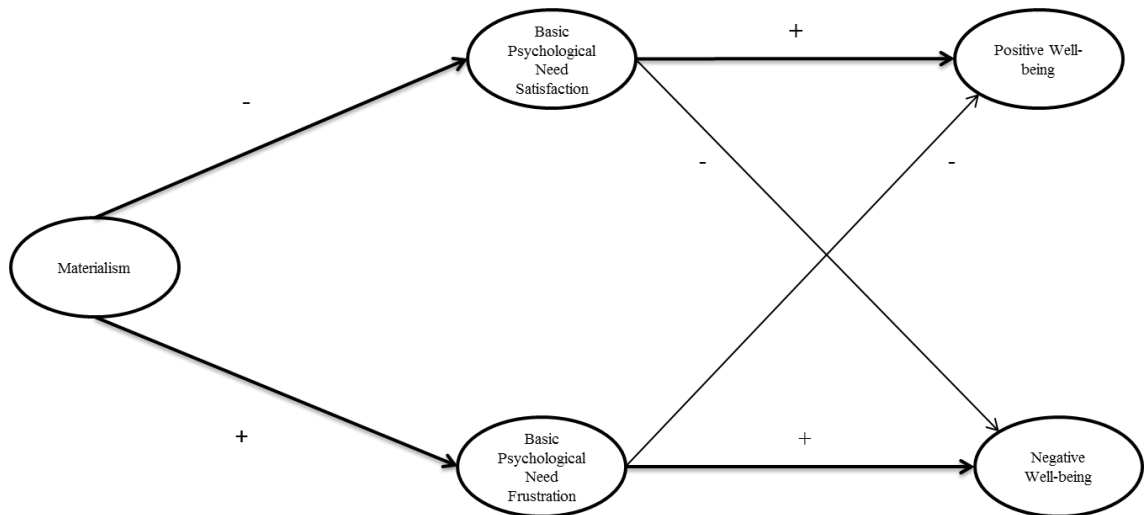
The final novel aspect is that our study was the first to assess participants in Chile, either from the SDT or from the materialistic values framework.

### **The Present Research**

Although the seminal papers on people’s materialistic strivings (Richins & Dawson, 1992) and their extrinsic, relative to, their intrinsic aspirations (Kasser & Ryan, 1993) came out about two decades ago and have spurred dozens of studies over the years, few studies to date have made use of comprehensive measures, instead either making use of materialistic values orientation scale or the aspiration index. In two relatively large samples of adults, we assessed both participants’ materialistic value orientations and their intrinsic and extrinsic aspirations. Further, although the materialism – well-being association is well-documented, the reasons why materialistic

strivings interfere with growth and even elicit ill-being remain less well understood. Consistent with recent developments within SDT (Bartholomew et al., 2011; Vansteenkiste & Ryan, 2013), we examined the separate and unique roles of need *satisfaction* and need *frustration* in the link from materialism to well-being and ill-being. Following Vansteenkiste and Ryan (2013), we predicted that need satisfaction would be primarily associated with growth and wellness, and need frustration primarily with malfunctioning and ill-being, but we also expected to observe weaker cross-paths: need satisfaction may play a protective role against malfunctioning and ill-being, and need frustration may lead to lower positive well-being since individuals have developed fewer resources for growth. Finally, we tested whether the paths in our model were moderated by national context, comparing adult samples in the UK—an established mass consumer society—with Chile—a fast-growing new economy, where no previous research to our knowledge has been conducted into materialistic values or into self-determination theory.

Based on the literature reviewed above, we sought to test the following hypotheses. First, we predicted that a stronger materialistic value orientation (modelled by the Aspirations Index and the Materialistic Values Scale) would be linked negatively to well-being and positively to ill-being (Hypothesis 1). Next, we aimed to test the integrated model depicted in Figure 1.1, in which the link between materialism and well-being would be explained by *both* psychological need satisfaction and psychological need frustration. This model was tested in a gradual and stepwise fashion. Specifically, we began by examining whether relationships between materialism and well-being and ill-being could be partially explained by basic need satisfaction (Hypothesis 2). We expected only partial mediation as the contribution of materialism to ill-being may not just be accounted for by the absence of need satisfaction, but also requires the more active obstruction and, hence, frustration of the psychological needs. Therefore, in a next step, we examined whether the addition of basic need frustration to our model would help to fully account for the materialism – ill-being association and thus testify to the incremental role of need frustration (Hypothesis 3). Finally, given the claim of Self-Determination Theory to study universal psychological processes (Ryan & Deci, 2000), we expected to find comparable support for hypotheses H1 to H3 in samples drawn from both UK and Chilean contexts (Hypothesis 4).



*Figure 1. 1:* Theoretical model for the associations between materialism, basic psychological need satisfaction, basic psychological need frustration, positive well-being and negative well-being in the UK and Chile.

## Method

### Participants and Procedure

The British sample consisted of 958 adults living in the UK, ranging in age from 20 to 77 years (Mean = 44.68;  $SD = 13.98$ ). Respondents (59% female) were former graduates, recruited through the alumni office of a university in the South East of England. The Chilean sample consisted of 257 adults living in Chile, ranging in age from 19 to 71 years (Mean = 34.81;  $SD = 10.54$ ). Respondents (53% female) were also all former graduates, recruited mostly through the alumni office of a university in Santiago, but also through personal contacts of the first author. Using a sample that consists entirely of graduates has the advantage that educational level is controlled for.

Statistical analyses revealed that the two samples differed significantly in age ( $F[1, 1214], p < .001$ ), but not in gender distribution [ $\chi^2(1) = 2.94, p = .09$ ]. However, controlling for these background characteristics did not change the substantive results reported in our structural models.

In a first instance, participants were sent an introductory email containing a brief description of the study along with a web link to the survey. UK participants were invited to participate in a research project by completing an online survey and were offered entry into a prize draw for university memorabilia. In Chile, the same instructions were sent but participants were not offered entry into a prize draw. The study was approved by the University of Sussex Research Ethics and Governance Committee and was conducted according to BPS and APA guidelines. All participants

provided written consent and were informed that they could withdraw from the study at any point. The purpose of the research was described in broad terms (hence, no deception was involved), and respondents were given the opportunity to receive a summary of the research findings. Respondents were also asked whether they would be happy to participate in future research, as it was anticipated that the survey would be the first wave of a multi-wave project.

The first page of the survey contained a brief description of the study, and the second page informed participants of their right to withdraw at any time, as well as assuring their anonymity and confidentiality with regards to their responses. Then, participants were asked to complete the core measures for the present research: well-being, need satisfaction, need frustration, and materialism. Some other measures were collected that are not relevant to the present hypotheses (e.g. measures about environmental attitudes and behaviours). The final section of the survey assessed demographic details, including (among others) age, gender, and income. This project used various scales, the majority of which have been used in previous research, and are known to have good psychometric properties. The questionnaire was translated into Spanish for the Chilean participants, and equivalence of meaning with the English version was checked through established back-translation procedures (Brislin, 1970).

In order to test for order effects, two versions of the survey were created. The first version asked participants first about well-being, need satisfaction and need frustration and then about materialism. The second version of the survey asked participants first about materialism, and then about well-being, need satisfaction and need frustration. MANOVAs were carried out in each sample with version as the independent variable and all core construct measures as dependent variables. In both the UK ( $F [10, 947] = 1.30, p = .23$ ) and in Chile ( $F [10, 246] = 1.40, p = .18$ ), the multivariate result was non-significant, indicating that the order in which respondents completed the measures did not have an impact on their responses.

## Measures

**Materialism.** Materialism was modelled as a latent variable in the tested structural models, using indicators derived from the two most commonly used scales in the research literature: the Aspiration Index (Kasser & Ryan, 1993, 1996) and the Materialistic Values Scale (Richins and Dawson, 1992).

***The Aspiration Index.*** We used a shortened, 30-item version of the Aspiration Index developed by Kasser & Ryan (Kasser & Ryan, 1993, 1996) to assess the importance of different life goals. We used 6 categories of aspirations with five specific items within each category. Aspirations are either extrinsic (money, fame, image) or intrinsic (affiliation, community involvement, self-development and health). We asked people to rate how important each goal is to them personally from *not at all* (1) to *very* (7). Example items are *To be a very wealthy person* (money), *To have my name known by many people* (fame), *To successfully hide the signs of aging* (image), *To grow and learn new things* (self-development), *To have good friends that I can count on* (affiliation), and *To work for the betterment of society* (community involvement). The internal reliability of the three intrinsic aspirations (self-development, community involvement and affiliation) ranged from acceptable to good in the UK ( $\alpha_s = .67, .91$ , and  $.85$  respectively) and in Chile ( $\alpha_s = .76, .89$ , and  $.77$ ). The internal reliability of the three extrinsic aspirations (money, fame and image) was good in the UK ( $\alpha_s = .86, .86$ , and  $.82$ ) and in Chile ( $\alpha_s = .87, .90$ , and  $.85$ ).

***The Materialistic Values Scale.*** We used the shortened, 9-item version developed by Richins and Dawson (1992) and revised by Richins (2004). Example items are *I admire people who own expensive homes, cars, and clothes*, *Buying things gives me a lot of pleasure*, and *My life would be better if I owned certain things I don't have*. Participants rated these statements on a 6-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (6). The internal reliability of the scale was good, both in the UK ( $\alpha = .83$ ) and in Chile ( $\alpha = .81$ ).

**Need satisfaction and need frustration.** To assess these constructs we used two scales: *Basic Psychological Need Satisfaction Scale* and *Basic Need Frustration Scale*.

***Basic psychological need satisfaction scale.*** This is a 9-item measure yielding a global score of individuals' need satisfaction (Sheldon, Elliot, Kim, & Kasser, 2001), including three items each to measure satisfaction of needs for autonomy, competence, and relatedness. Items are shown in Table 1.1. Participants rated these statements on a 6-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (6). One item was deleted based on a factor analysis that we describe shortly. The internal reliability in this research was good, both in the UK ( $\alpha = .84$ ) and in Chile ( $\alpha = .81$ ).

***Basic psychological need frustration scale.*** To measure basic need frustration we used the nine items developed by Sheldon and Gunz (2009), including three items

each to measure frustration of needs for autonomy, competence, and relatedness. Items are also shown in Table 1.1. Participants rated these statements on a 6-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (6). One item was deleted based on a factor analysis that we describe shortly. The final scale showed a good internal reliability, both in the UK ( $\alpha = .80$ ) and in Chile ( $\alpha = .78$ ).

**Well-being.** We employed six scales assessing a wide array of well-being dimensions, including measures typically used to assess subjective well-being (life satisfaction, positive affect, negative affect), as well as mental health measures (depression and subjective vitality), and physical symptoms of ill-health.

**Satisfaction with life.** We used the 5-item *Satisfaction with Life Scale* developed by Diener, Emmons, Larsen, & Griffin (1985) to measure the cognitive component of subjective well-being. Example items are *In most ways my life is close to my ideal* and *The conditions of my life are excellent*. Participants rated these statements in a 6-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (6). The internal reliability of the scale was good, both in the UK ( $\alpha = .87$ ) and in Chile ( $\alpha = .87$ ).

**Positive and negative affect.** We used the 10-item measure *International Positive and Negative Affect Schedule Short Form* (I-PANAS-SF, Thompson, 2007), which includes separate subscales measuring positive affect (5 items) and negative affect (5 items). Example items asked participants how frequently they have felt *inspired*, *alert*, *upset*, and *nervous* during the last month. Participants rated these questions in a 5-point scale ranging from *never* (1) to *always* (5). The measure showed good internal reliability, both in the UK (positive affect:  $\alpha = .79$ ; negative affect:  $\alpha = .77$ ) and in Chile (positive affect:  $\alpha = .72$ ; negative affect:  $\alpha = .72$ ).

**Vitality.** We employed the *Subjective Vitality scale* (Ryan & Frederick, 1997), a 7-item measure developed to evaluate how alive and alert people have been feeling during the last month. Participants rated their agreement with statements such as *I feel alive and vital* and *I don't feel very energetic*, on a 7-point response scale from *not at all true* (1) to *very true* (7). Internal reliability was good, both in the UK ( $\alpha = .91$ ) and in Chile ( $\alpha = .87$ ).

**Depressive symptoms.** We employed a slightly shortened version (16 items) of the *Centre for Epidemiological Studies-Depression Inventory* (CES-D; Radloff, 1977) measure, designed to obtain an individual global depression score in nonclinical samples. Example items are *I did not feel like eating*, *My appetite was poor*, and *I felt that I couldn't stop feeling down even with help from my family or friends*. Participants

rated these statements on a 4-point scale ranging from *rarely or none of the time* (0) to *most or all of the time* (3). The internal reliability of the scale was good, both in the UK ( $\alpha = .89$ ) and in Chile ( $\alpha = .89$ ).

**Physical symptoms of ill-health.** We employed seven items from the *General Health Questionnaire* developed by Goldberg et al (1997) to obtain a measure of participants' global health. For the purpose of this study, just part A (7 items) of the original scale was used, in order to focus on physical symptoms. Participants responded to questions such as how often they had recently been *feeling in need of a good tonic* or *feeling run down and out of sorts* on a 5-point scale from *never* (1) to *always* (5). The internal reliability of these 7 items was good, both in the UK ( $\alpha = .84$ ) and in Chile ( $\alpha = .81$ ).

Table 1.1: Exploratory Factor Analysis of the items from the Basic Psychological Need Satisfaction and The Basic Psychological Need Frustration Scales in the UK

Scale items	Loading on factor	
	EFA <sup>a</sup> (N=479)	
	Factor 1	Factor 2
<i>Basic Psychological Need Satisfaction Scale (BPNS)</i>		
I felt a sense of contact with people who care for me, and	.72	-.07
I felt close and connected with other people who are impor	.71	-.01
I felt a strong sense of intimacy with the people I spent tin	.73	-.11
I was successfully completing difficult tasks and projects	.62	.04
I took on and mastered hard challenges	.64	-.06
I did well even at the hard things	.58	.06
I was free to do things my own way	.23	.38
My choices expressed my "true self"	.43	.27
I was really doing what interests me	.51	.26
<i>Basic Psychological Need Frustration Scale (BPNF)</i>		
I was lonely	-.31	-.34
I felt unappreciated by one or more important people	-.06	-.45
I had disagreements or conflicts with people I usually get :	.03	-.56
I experienced some kind of failure, or was unable to do w	-.07	-.60
I did something stupid, that made me feel incompetent	.00	-.50
I struggled doing something I should be good at	-.07	-.56
I had a lot of pressures I could do without	.12	-.66
There were people telling me what I had to do	.11	-.63
I had to do things against my will	-.05	-.63

<sup>a</sup> Exploratory Factor Analyses

## Results

### Plan of Analysis

We employed structural equation modelling (SEM, AMOS 18.0) to assess the hypothesized associations between materialism, basic psychological need satisfaction, basic psychological need frustration and positive and negative well-being. Descriptive statistics and inter-correlations for these study variables are shown in Table 1.2. In order



to proceed with the analysis we modelled all constructs as latent variables using three, four or six observed indicators per factor. Following the recommendations of Little, Cunningham, Shahar, and Widaman (2002), for most indicators, we created item parcels, as described below.

**Materialism.** We modelled our materialism measure as a latent construct using six different indicators: three parcels provided by the Aspiration Index and three subscales of the Materialistic Values Scale.

***The Aspiration index.*** To obtain the relative importance placed on extrinsic aspirations compared to intrinsic ones, we followed Duriez, Vansteenkiste, Soenens, and De Witte (2007). First, an individual's overall mean score was subtracted from each individual score. Second, the intrinsic items were reversed and an overall extrinsic versus intrinsic (E/I) value score was computed by averaging the extrinsic and the (reversed) intrinsic scales. Cronbach's alpha range from acceptable in the UK ( $\alpha = .73$ , Mean = -1.51, SD = .42) to good in Chile ( $\alpha = .82$ , Mean = -1.40, SD = .36). Positive (negative) scores reflect a tendency to prefer extrinsic (intrinsic) rather than intrinsic (extrinsic) values. Finally, we randomly created three parcels employing one extrinsic and one (reversed) intrinsic scale to be used as indicators.

***The Materialistic Values Scale.*** The Materialistic Values Scale (Richins & Dawson, 1992) is based on the conceptualization of a value system with three interrelated dimensions: centrality, happiness, and success. Based on this, we created three indicators from the three subscales previously mentioned.

**Need satisfaction and need frustration.** To date, only one paper (Sheldon and Gunz, 2009) has directly tested the distinguishability of need satisfaction and need frustration. Rather than being opposite ends of a single dimension, we expected that the two scales would measure two separate constructs. We checked this assumption through a two-stage process of exploratory factor analysis (EFA), followed by confirmatory factor analysis (CFA: for a similar approach, see Dittmar, 2005).

Table 1. 2: Descriptives and Inter-Correlations Between All Study Variables in the UK and Chile

	M	SD	1	2	3	4	5	6	7	8	9	10	11	12
<i>UK participants</i>														
1. Gender (% of female)														
2. Age	44.68	13.98	-.13***											
3. Annual Income <sup>a</sup>	2.48	1.39	-.31***	.20***										
4. Materialism Values Scale (MVS)	2.66	0.85	-.01	-.28***	.07*									
5. Relative extrinsic/ intrinsic life goals (E/I)	-2.95	1.20	-.16***	-.12***	.14***	.52***								
6. Basic Psychological Need satisfaction (BPNS)	4.34	0.80	.04	.16***	.11***	-.18***	-.24***							
7. Basic Psychological Need Frustration (BPNF)	2.81	0.93	.04	-.19***	-.11***	.27***	.15***	-.42***						
8. Life satisfaction (SLS)	4.10	1.03	.06*	.10**	.12***	-.17***	-.16***	.53***	-.44***					
9. Depressive Symptoms (CES-D)	0.71	0.52	.02	-.19***	-.17***	.23***	.17***	-.55***	.67***	-.57***				
10. Panas Positive Affect	3.59	0.61	.04	.19***	.12***	-.17***	-.22***	.64***	-.36***	.42***	-.51***			
11. Panas Negative Affect	2.14	0.65	.09**	-.22***	-.15***	.23***	.14***	-.38***	.59***	-.38***	.67***	-.31***		
12. Vitality (SVS)	4.30	1.25	.01	.16***	.11***	-.20***	-.21***	.66***	-.48***	.50***	-.65***	.72***	-.43***	
13. General Health (GHQ)	2.01	0.74	.13***	-.17***	-.13***	.19***	.08**	-.34***	.50***	-.33***	.60***	-.34***	.48***	-.50***
<i>Chilean participants</i>														
1. Gender (% of female)														
2. Age	34.81	10.54	-.09											
3. Annual Income <sup>a</sup>	2.58	1.49	-.27***	.46***										
4. Materialism Values Scale (MVS)	2.76	0.86	-.01	-.12	-.12									
5. Relative extrinsic/ intrinsic life goals (E/I)	-2.68	1.33	-.19**	-.11	.03	.59***								
6. Basic Psychological Need satisfaction (BPNS)	4.60	0.75	.12*	.08	.08	-.27***	-.25***							
7. Basic Psychological Need Frustration (BPNF)	2.82	0.91	-.05	-.23***	-.21***	.32***	.30***	-.37***						
8. Life satisfaction (SLS)	4.47	0.92	.17**	.04	.17**	-.22***	-.19**	.53***	-.34***					
9. Depressive Symptoms (CES-D)	0.70	0.51	.00	-.04	-.24***	.20**	.15*	-.56***	.55***	-.57***				
10. Panas Positive Affect	3.66	0.63	-.04	.08	.18**	-.09	-.03	.56***	-.23***	.37***	-.46***			
11. Panas Negative Affect	2.32	0.62	.03	-.15*	-.15*	.25***	.19**	-.32***	.55***	-.32***	.55***	-.17**		
12. Vitality (SVS)	4.88	1.16	.02	.07	.14*	-.18**	-.15*	.64***	-.31***	.49***	-.66***	.60***	-.38***	
13. General Health (GHQ)	2.20	0.72	.11	-.03	-.08	.33***	.24***	-.28***	.36***	-.29***	.46***	-.17**	.43***	-.43***

\*  $p \leq .05$  \*\*  $p \leq .01$  \*\*\*  $p \leq .001$ <sup>a</sup>Income (British pounds): 1 = < 20.000; 2 = 20.000 – 29.999; 3 = 30.000 – 39.999; 4 = 40.000 – 60.000; 5 = > 60.000<sup>b</sup>Income (Chilean pesos): 1 = < 650.000; 2 = 650.000 – 999.999; 3 = 1000.000 – 1499.999; 4 = 1500.000 – 2000.000; 5 = > 2000.000

We carried out an EFA within the first half of the UK sample ( $N = 479$ ). The findings are summarized in Table 1.1, showing the factor loadings for items on their respective scales. The initial EFA stipulated two factors and allowed them to covary (principal axis factoring with oblimin rotation and Kaiser normalization), including all need satisfaction and need frustration items. The EFA on all items showed excellent sampling adequacy ( $KMO = .86$ , Bartlett's  $X^2(153) = 3379.77$ ,  $p < .001$ ), and accounted for 36.97% of the variance. The two factors correlated negatively, as expected ( $r = -.41$ ). Table 1.1 shows that all except two items loaded above .4 on their respective factor, and less than .3 on the other factor. Item 7 of the need satisfaction scale (*I was free to do things my own way*) and item 1 of the need frustration scale (*I was lonely*) did not load cleanly on their respective factors. Hence, we decided to drop both items from their respective scales to avoid possible overlap. These results provide initial support for the distinctiveness of the need satisfaction and need frustration constructs.

Next, we ran a CFA in both the second half of the UK sample ( $N = 479$ ) and in the Chilean sample ( $N = 257$ ). Fit statistics in the UK revealed some discrepancy between the specified model and the data,  $\chi^2(9) = 17.70$ ,  $p < .001$ , which is to be expected, but showed indexes ( $CFI = .99$ ,  $RMSEA = .05$ ) that demonstrated good model fit (Kline, 2005). In Chile, fit indexes were also acceptable ( $\chi^2(9) = 28.49$ ,  $p < .001$ ,  $CFI = .97$ ,  $RMSEA = .10$ ). Chi-squared change shows that modelling need satisfaction and need frustration as different constructs fit significantly better than a single-factor model in the UK ( $\Delta\chi^2(1) = 177.58$ ,  $p < .001$ ) and in Chile ( $\Delta\chi^2(1) = 447.01$ ,  $p < .001$ ).

Based on these findings, we built latent variables for the need satisfaction and the need frustration scales, using three item parcels as indicators of each construct (Little et al., 2002). In order to give equal importance in our measures to the three basic needs, each parcel included items referring to all three needs, except that one satisfaction parcel included items referring to relatedness and competence only, and one frustration parcel included items referring to autonomy and competence only.

**Well-being.** Given our expectation that the need satisfaction scale would be more predictive of positive well-being outcomes whereas the need frustration scale would be more predictive of negative well-being outcomes, we initially tried to model positive and negative well-being as two latent constructs. However, initial analyses suggested that a two-factor model was too simple, and that the 6 well-being variables would be better represented as four latent factors, two positive and two negative.

Vitality and positive affect loaded together and were modelled as the first positive well-being latent construct: we created four item parcels (two from each scale) and called this *positive emotional well-being*. The second positive well-being latent construct was *life satisfaction*, modelled using three item parcels. Negative affect and depressive symptoms loaded together and were modelled as the first negative well-being construct: we created four item parcels (two from each scale) and called this *negative emotional well-being*. The second negative well-being variable focused on physical symptoms of ill-health, using 3 item parcels from the General Health Questionnaire: we called this *negative physiological symptoms*.

### **Measurement Model**

We developed a multigroup 7-factor measurement model for the British and Chilean samples. The results (Table 1.3) revealed some discrepancy between the specified model and the data,  $\chi^2(556) = 1746.64$ ,  $p < .001$ , which is to be expected. Values of CFI = .93 and RMSEA = .04 demonstrated acceptable model fit (Kline, 2005).

To test for metric invariance, we constrained all the factor loadings in our measurement model to be equal across the two groups, and then we compared this model to the baseline model where no constraints were imposed. As shown in Table 1.3, the model fit remained acceptable:  $\chi^2(575) = 1812.99$ ,  $p < .001$ ; CFI = .93; RMSEA = .04. According to Cheung and Rensvold (2002), the assumption of invariance is tenable if the reduction in CFI when constraints are imposed is less than .01. Here, the reduction in CFI comfortably met this criterion ( $\Delta\text{CFI} = -.003$ ). Therefore, it can be concluded that the pattern of factor loadings was invariant across countries. Hence, we maintained these constraints in all structural models reported below.

### **Structural Models**

We now tested three structural equation models to examine our different hypotheses. In initial analyses, we controlled for age, gender and income in both samples. However, including these variables neither significantly affected the structural relationships between the latent constructs nor the results of the main predictions. Therefore, for simplicity, we report models without these additional variables. For testing model fit in all structural models, we followed Hu and Bentler's (1999) and Kline's (2005) criteria.

Table 1. 3: Fit Statistics for the models in the UK and Chile

Model Description	Comparative model	$\chi^2$	df	$\Delta\chi^2$	$\Delta df$	CFI	$\Delta CFI$	RMSEA	$\Delta RMSEA$	$\chi^2$ significance
Measurement Model		1746.64	556.00			0.93		0.04		$\rho < .001$
Measurement Model all Factor Loading Constrained equals	Measurement Model	1812.99	575.00	66.35	19.00	0.93	-0.003	0.04	0.00	$\rho < .001$
Model 1										
Model 1.a. All factor loadings constrained equals	Model 1	1310.43	335.00			0.92		0.05		$\rho < .001$
Model 1.b. Factor loadings + all structural paths constrained equals	Model 1a	1317.72	339.00	7.29	4.00	0.92	0.000	0.05	0.00	$\rho < .001$
Model 2										
Model 2.a. All factor loadings constrained equals	Model 2	1577.62	447.00			0.93		0.05		$\rho < .001$
Model 2.b. Factor loadings + all structural paths constrained equals	Model 2a	1594.28	456.00	16.66	9.00	0.93	0.000	0.05	0.00	$\rho < .001$
Model 3										
Model 3.a. All factor loadings constrained equals	Model 3	1812.92	575.00			0.93		0.04		$\rho < .001$
Model 3.b. Factor loadings + all structural paths constrained equals	Model 3a	1839.89	589.00	26.96	14.00	0.93	0.000	0.04	0.04	$\rho < .001$
Model 3.c. Factor loadings + all paths (except paths from materialism to PEWB and to NPS) constrained	Model 3a	1831.99	587.00	19.06	12.00	0.94	0.010	0.04	0.00	$\rho < .001$

Note.  $\Delta\chi^2$  = difference in chi-square values between models;  $\Delta df$  = difference in number of degrees of freedom between models; BPNF = basic psychological need frustration  
NPS = negative physiological symptoms; PEWB = personal emotional well-being

**Model 1: Associations between materialism and positive and negative well-being.** To test our first hypothesis, we set up a multigroup model in which materialism was allowed to predict the four well-being outcomes (Figure 1.2). Initially, we estimated all structural paths freely across the two national samples (Model 1a, Table 1.3). The model showed acceptable fit to the data,  $\chi^2(335) = 1310.43$ ,  $p < .001$ , CFI = .92, RMSEA = .05. Then, to test whether the results differed significantly across the UK and Chilean samples, we constrained the paths from materialism to each of the four well-being constructs to be equal across the two samples. Fit statistics for this model are shown in Table 1.3, Model 1b. The model fit remained acceptable,  $\chi^2(339) = 1317.72$ ,  $p < .001$ ; CFI = .92; RMSEA = .05, and there was no significant loss of fit,  $\Delta\chi^2(4) = 7.29$ ,  $p = .12$ . Therefore, there was no evidence that the relationship between materialism and well-being differed across the two samples. In both countries materialism was a significant predictor of all four well-being constructs. Materialism predicted lower positive emotional well-being, lower life-satisfaction, as well as higher negative emotional well-being and higher negative physiological symptoms. R-square values (Table 1.4) ranged from .04 to .06 in the UK and from .06 to .08 in Chile. In conclusion, our first hypothesis received empirical support in both countries: the endorsement of materialistic values is linked to lower positive well-being and to higher negative well-being in the UK and Chile.

**Model 2: Need satisfaction as mediator.** To test our second hypothesis, we added basic psychological needs satisfaction as a potential mediator in the link between materialism and personal well-being (Figure 1.3). Again, we initially estimated all structural paths freely across the two samples (Model 2a, Table 1.3). The model showed acceptable fit indices,  $\chi^2(447) = 1577.622$ ,  $p < .001$ ; CFI = .93; RMSEA = .05.

Then, to test whether the results differed significantly across the two samples, we tested a model with the structural paths constrained across samples. Fit statistics for this model are shown in Table 1.3, Model 2b. The model showed acceptable fit indices,  $\chi^2(456) = 1594.28$ ,  $p < .001$ ; CFI = .93; RMSEA = .05, and model fit did not decrease,  $\Delta\chi^2(9) = 16.66$ ,  $p = .05$ , suggesting that none of the paths differed significantly across countries. The explained variance for the well-being indicators showed a substantial improvement from Model 1a (see Table 1.4 for comparisons) ranging .14 to .58 in the UK and from .16 to .56 in Chile.

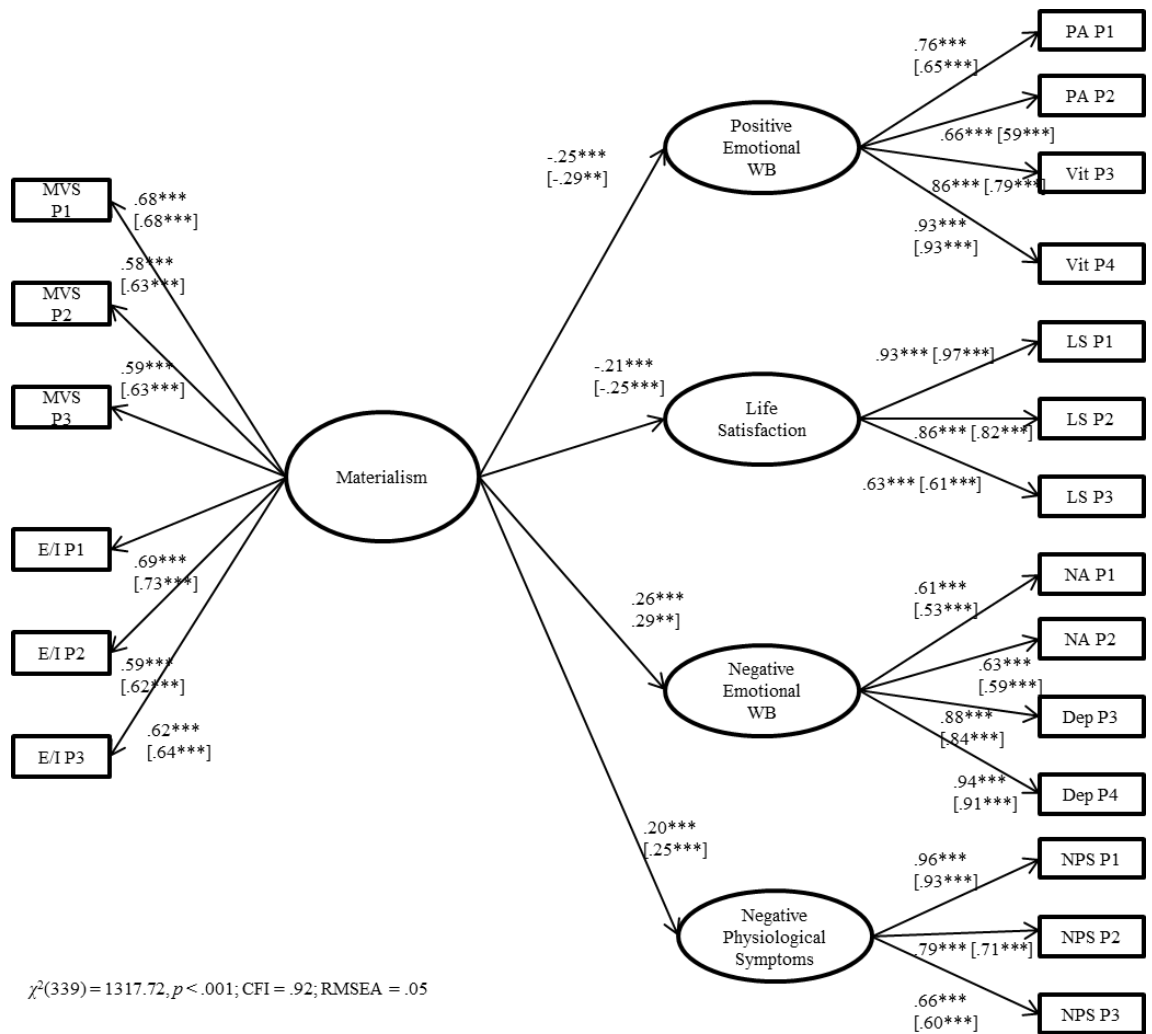


Figure 1. 2: Model 1. Structural multigroup model for the associations between materialism and well-being in the UK and Chile. Coefficients shown are standardized paths in the constrained model.

Note: Chilean coefficients are in brackets. Error terms are not shown to enhance visual clarity. MVS = Materialism Values Scale; E/I = relative extrinsic-intrinsic goals; WB = well-being; Pi = parcel i; PA = positive affect; Vit = vitality; NA = negative affect; Dep = depressive symptoms. \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$ . Solid lines = significant paths in both countries

Table 1. 4: Modelled variance for all the constructs in the UK and Chile

	R <sup>2</sup> model 1	R <sup>2</sup> model 2	R <sup>2</sup> model 3
<i>UK</i>			
1. Positive affect and vitality	0.06	0.58	0.63
2. Satisfaction with life	0.04	0.33	0.39
3. Negative affect and depression	0.07	0.36	0.63
4. Symptoms of ill-health	0.04	0.14	0.29
5. BPNS		0.08	0.08
6. BPNF			0.09
<i>Chile</i>			
1. Positive affect and vitality	0.08	0.56	0.56
2. Satisfaction with life	0.06	0.35	0.39
3. Negative affect and depression	0.09	0.37	0.61
4. Symptoms of ill-health	0.06	0.16	0.32
5. BPNS		0.11	0.11
6. BPNF			0.12

Note. BPNS = basic psychological need satisfaction

BPNF = basic psychological need frustration

The predicted mediation through basic need fulfilment was supported in both countries: materialism was a significant predictor of basic need satisfaction, and need satisfaction, in turn, was a significant predictor of both positive and negative well-being. Need satisfaction related positively to positive emotional well-being and life-satisfaction, while relating negatively to negative emotional well-being and physiological illness. The mediating role of need satisfaction was confirmed through the Sobel test for all indirect paths between materialism and the well-being indicators in the UK and Chile. The results showed that need satisfaction mediated the relationships between materialism and all the well-being indicators: materialism and positive emotional well-being,  $z = -7.61, p < .001$ ; materialism and life-satisfaction,  $z = -7.40, p < .001$ ; materialism and negative emotional well-being,  $z = 7.14, p < .001$  and materialism and negative physiological symptoms,  $z = 6.39, p < .001$ .

In this model, materialism becomes a non-significant predictor of positive emotional well-being and life-satisfaction, providing evidence for the explanatory role of need satisfaction. However, materialism remained a significant predictor of negative emotional well-being and negative physiological symptoms, consistent with our



expectation that need frustration may need to be added to account for the remaining direct association, an issue we addressed in Model 3.

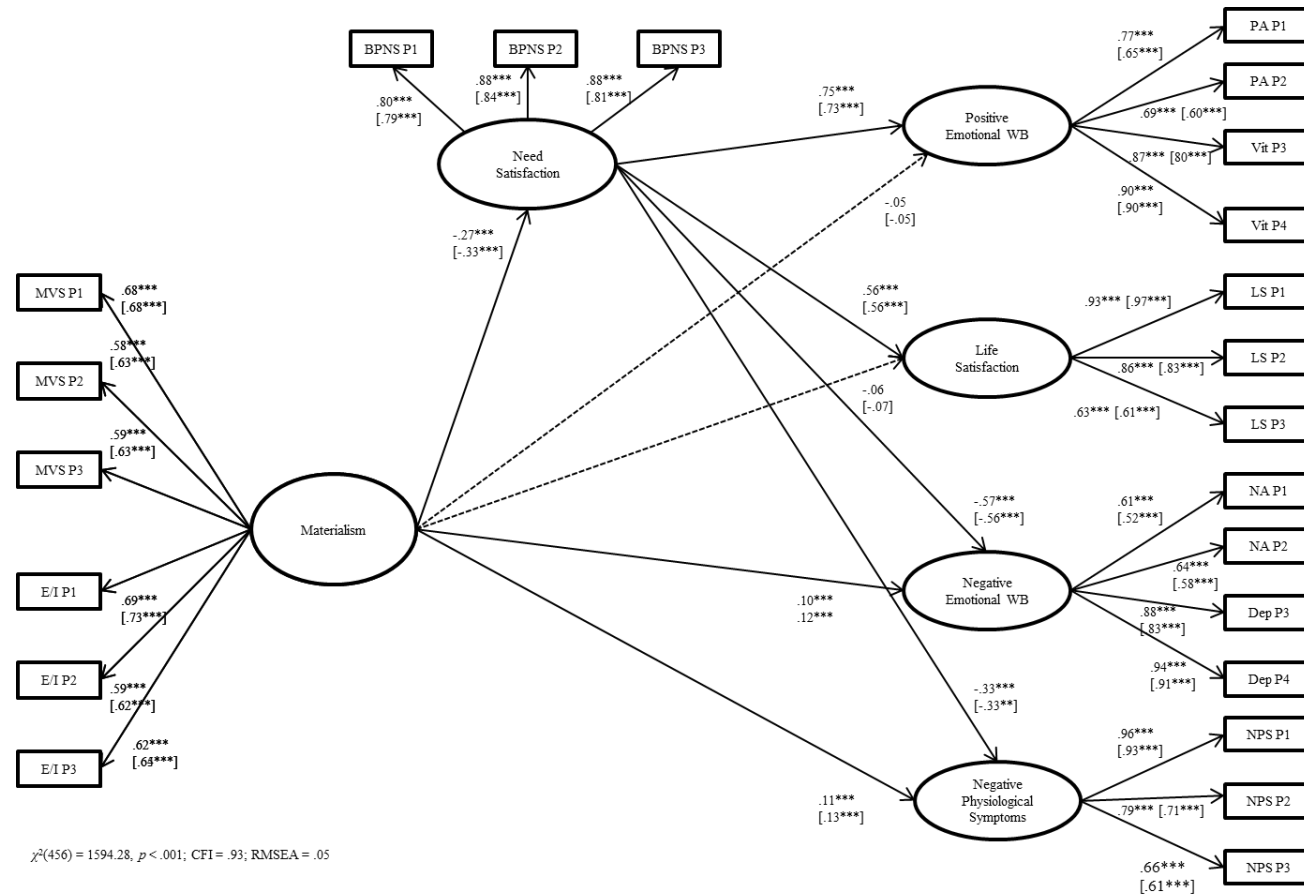


Figure 1.3: Model 2. Structural multigroup model for the associations between materialism, basic psychological need satisfaction (BPNS) and well-being in the UK and Chile.

Note: Coefficients shown are standardized paths in the constrained model. Chilean coefficients are in brackets. Error terms are not shown to enhance visual clarity. MVS = Materialism Values Scale; E/I = Extrinsic relative to Intrinsic life goals; WB = well-being; Pi = parcel i; PA = positive affect; Vit = vitality; NA = negative affect; Dep = depressive symptoms. \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$ . Dotted lines = non-significant paths in both countries; solid lines = significant paths in both countries.

**Model 3: Need satisfaction and need frustration as mediators.** To test our third hypothesis, we added the basic psychological need frustration as an additional mediator, in parallel with need satisfaction (Figure 1.4). As before, we initially modelled all paths freely across both samples (Model 3a, Table 1.3). The model showed acceptable fit indices,  $\chi^2(575) = 1812.92$ ,  $p < .001$ ; CFI = .93; RMSEA = .04. To test whether the results differed significantly across the two samples, we now tested a model with the structural possible paths constrained across samples (Model 3b, Table 1.3). This model showed acceptable fit indices,  $\chi^2(489) = 1839.89$ ,  $p < .001$ ; CFI = .93; RMSEA = .04. However, it showed a significant loss of fit compared to Model 3a,  $\Delta\chi^2(10) = 23.92$ ,  $p < .05$ . Inspection of the specific paths revealed that when we constrained the path between materialism and negative physiological symptoms and the path between materialism and positive emotional well-being, the model showed significant lower fit under the  $\chi^2$  criterion (Table 1.3). Therefore, we estimated these two paths freely in each nation. Nevertheless, as we describe below, neither path reached conventional levels of statistical significance in either sample. Further, the results showed that this partially constrained model (Model 3c, Table 1.3) showed no significant loss of fit in comparison with the model with all paths estimated freely (Model 3a, Table 1.3),  $\Delta\chi^2(12) = 19.06$ ,  $p = .09$ . Thus, it may be assumed that the remaining structural paths are not significantly different across countries. Fit statistics are shown in Table 1.3, Model 3c.

In our final model, materialism was a significant predictor of basic need satisfaction, which, in turn, was a significant predictor of both positive and negative well-being. In addition, materialism was a significant predictor of basic need frustration which, in turn, predicted both positive and negative well-being. The results showed that in the UK and Chile, need satisfaction ( $z = -7.56$ ,  $p < .001$ ) and need frustration ( $z = -5.55$ ,  $p < .001$ ) significantly mediated the relationship between materialism and positive emotional well-being. In addition, need satisfaction ( $z = -7.10$ ,  $p < .001$ ) and need frustration ( $z = -5.84$ ,  $p < .001$ ) also significantly mediated the association between materialism and life-satisfaction. Moreover, need satisfaction ( $z = 6.72$ ,  $p < .001$ ) and need frustration ( $z = 7.29$ ,  $p < .001$ ) significantly mediated the relationship between materialism and negative emotional well-being. Finally, need satisfaction ( $z = 4.52$ ,  $p < .001$ ) and need frustration ( $z = 6.91$ ,  $p < .001$ ) significantly mediated the association between materialism and negative physiological symptoms.

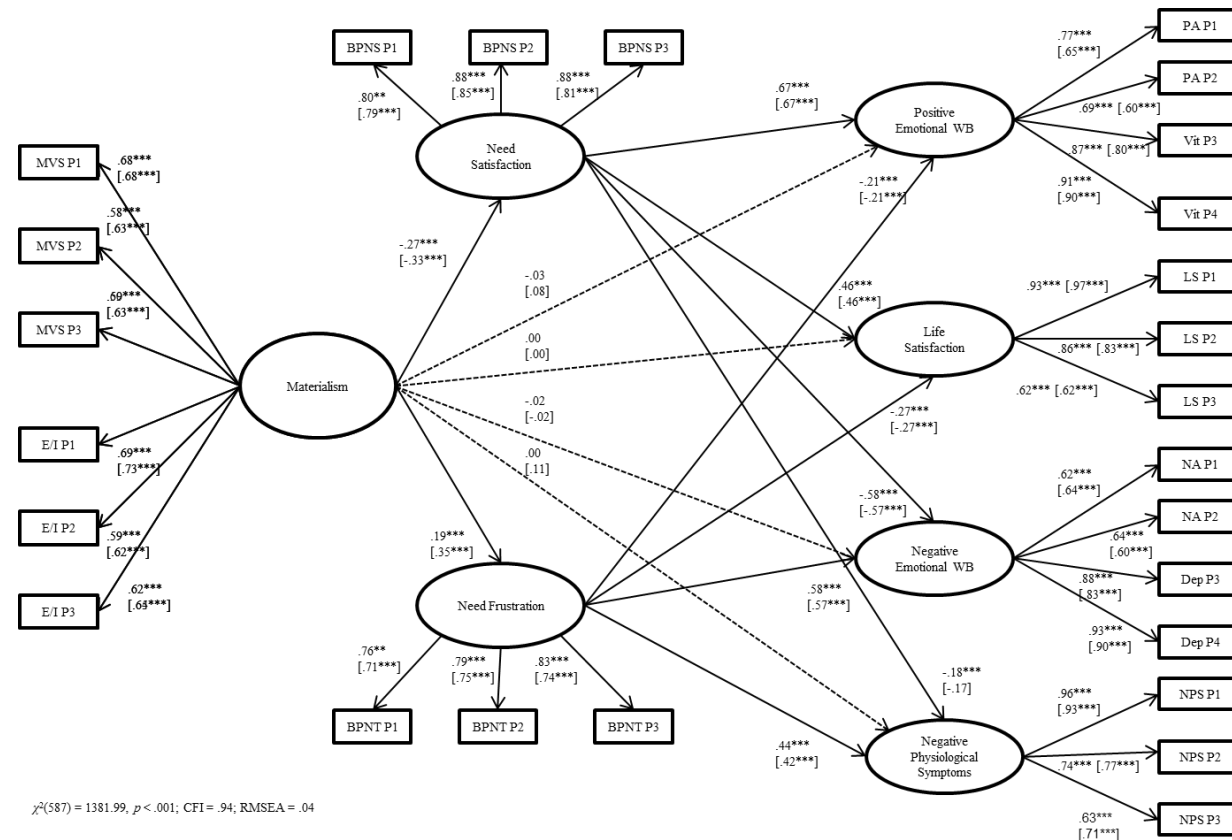


Figure 1. 4: Model 3. Structural multigroup model for the associations between materialism, basic psychological need satisfaction (BPNS), basic psychological need frustration (BPNF) and well-being in the UK and Chile.

Note: Coefficients shown are standardized paths in the constrained model. Chilean coefficients are in brackets. Error terms are not shown to enhance visual clarity. MVS = Materialism Values Scale; E/I = Extrinsic relative to intrinsic life goals; WB = well-being; PEWB = positive emotional WB; NEWB = negative emotional WB; LS = life satisfaction; NPS = negative physiological symptoms; Pi = parcel i; PA = positive affect; Vit = vitality; NA = negative affect; Dep = depressive symptoms. \*  $p < .05$  \*\*  $p < .01$  \*\*\*  $p < .001$ . Dotted lines = non-significant paths in both countries; solid lines = significant paths in both countries.

Within this final model, materialism no longer significantly predicted any of the well-being indicators in the UK and in Chile with just one, marginal, exception (Figure 1.4). In the Chilean sample, the path from materialism to negative physiological symptoms remained marginally significant ( $\beta = .11$ ,  $p < .08$ ). Although our invariance test had shown a significant difference between samples in the path from materialism to positive emotional well-being, this path did not reach significance in its own terms in either sample. Thus, need satisfaction and need frustration together largely accounted for the links between materialism and all well-being outcomes in both cultures, showing the important additional role played by need frustration especially in predicting the negative well-being indicators

### Discussion

In the current research, using relatively large samples of adults from two very different societies, and more comprehensive measures than employed for previous studies, we extended previous findings into the link between materialism and well-being in four ways.

First, supporting H1, a stronger materialistic value was associated with lower levels of positive psychological well-being as well as higher levels of negative well-being. Our results replicated earlier findings about the well-being outcomes associated with materialism (Dittmar, 2008; Kasser & Ryan, 1993, 1996, Richins & Dawson, 1992), but also demonstrated that this effect is present not just in mass consumer societies such as the UK, but also in a developing South American country: Chile. The average size of these relationships (mean  $|\beta| = .24$ ) was comparable to the average disattenuated correlation of .19 between materialistic values and various indicators of lower well-being reported in the recent meta-analysis by Dittmar and colleagues (in press). As expected, in both samples, materialism was linked with affective, cognitive, and health dimensions of personal well-being, suggesting that a consumer culture orientation may have more wide-ranging negative consequences for adults than previously acknowledged. This effect presumably emerges because the meaning attached to the materialistic strivings in Chilean participants was no different from the meaning assigned by UK citizens. That is, materialism stands in the service of boosting one's self-worth and is believed to represent a pathway to success and life satisfaction. Similar results were reported by Chen, Van Assche, Vansteenkiste, Soenens, and Beyers (2013), who showed that even the attainment of materialistic

strivings in a very poor Chinese rural-to-urban migrant workers related negatively to well-being. Yet, in this same poor sample, the experience of financial security, which was argued to stand in the service of basic survival, related positively to well-being.

Second, supporting H2, the association of materialistic values with lower levels of positive psychological well-being and higher levels of negative well-being was mediated by basic psychological need satisfaction. To our knowledge, this is the first research to examine either SDT or materialistic values in Chile. Our results showed that the higher the materialistic value orientation, the lower the need satisfaction and, as result, the lower the positive and the higher the negative well-being in the UK and in Chile. Searching for material rewards takes time and energy away from fulfilling basic psychological needs. Non-fulfilment of these needs leads to diminished motivation and personal well-being, causing psychological problems such as depression, negative affect and physical illness, but also decreasing satisfaction with life and positive affect (Deci & Ryan, 2000; Sheldon et al., 2001).

Third, supporting H3, and extending the work of Sheldon and Gunz (2009), we demonstrated with CFA that a lack of need satisfaction can be distinguished empirically from need frustration, and thus we suggest that both variables can be modelled separately in future research. Our results supported recent claims that it is necessary to distinguish between the lack of fulfilment of basic needs and the experience of need frustration because both lower *need satisfaction* and *higher need frustration* can be detrimental to psychological well-being (Bartholomew et al., 2011; Vansteenkiste & Ryan, 2013).

In support of H3, we also found that need frustration played an incremental explanatory role in the links between materialism and well-being, above and beyond the role of need satisfaction. Specifically, the higher the materialistic value orientation, the higher the need frustration and, in turn, the lower the positive and the higher the negative well-being in the two samples. This is a key finding for SDT, and perhaps the most novel contribution of our research. The frustration of basic psychological needs relates to psychological problems which can produce severe costs for personal well-being (Deci & Ryan, 2000). Therefore, these findings support the claims of SDT regarding the role of need frustration as a separate construct from low satisfaction. Finally, it was also shown that need satisfaction and need frustration together could

completely account for the link between materialism and both positive and negative well-being in the UK and Chile.

Our results also supported the prediction of SDT (Vansteenkiste & Ryan, 2013) that, whereas the satisfaction of psychological needs might primarily foster positive forms of well-being, the frustration of the psychological needs may especially lead to ill-being. Even though we found significant crossover paths (shown in Figure 1.4), results showed that need satisfaction was generally more strongly associated to positive outcomes (positive emotional well-being and life-satisfaction) than need frustration, whereas need frustration was more strongly associated to negative outcomes (e.g., negative physiological symptoms) than need satisfaction. This finding also extends Bartholomew et al.'s (2011) claims, demonstrating among adult participants in two different cultures that, whereas need satisfaction is more strongly predictive of positive well-being, need frustration is more strongly associated with maladjustment and ill-being.

Fourth, and finally, we demonstrated that the negative link between materialism and well-being and the mediation of need satisfaction and need frustration did not differ, in general, across national contexts, when we compared the UK—an established mass consumer society—with Chile—a fast-growing new economy. Our main findings in the UK were replicated in the Chilean population showing that a stronger materialistic value orientation is linked to lower positive well-being and to higher negative well-being through the mediation of basic need satisfaction and basic need frustration. In Models 2 and 3, the effects sizes of basic needs on well-being were substantially larger than the effect sizes of materialism on well-being in Model 1. This is to be expected because materialistic values are just one variable among many others that might be expected to influence well-being, whereas many different influences on well-being might be expected to have their effects through need satisfaction and need frustration (Deci & Ryan, 2000). The fact that most of the paths in our models did not differ even in size across samples provides fairly convincing evidence for the generality of the proposed need mechanisms central to SDT, at least among the graduate populations that we sampled.

### **Limitations and Future Directions**

Given that our participants were all university graduates, we should be cautious about generalizing these findings to poorer and less educated groups. Nonetheless,

several studies suggest that the link between materialism and well-being is not restricted to wealthy samples. Chen et al. (2013) found a negative association between materialism and well-being even in a poor Chinese sample. In addition, Kasser, Ryan, Zax, and Maneroff (1995) found that the most materialistic American teenagers were those who grew up in more deprived economic environments. Finally, in a recent meta-analysis (Dittmar et al., in press) examining the association between materialism and personal well-being, although the link was stronger in wealthier countries, the negative association was robust across a variety of studies, samples, and economic conditions.

Finally, despite the strong evidence regarding the link between materialism and well-being, one important limitation of the present research involves its correlational design, which does not allow one to infer causality. Although higher materialism may produce lower well-being due to the mediating role of need satisfaction (Kasser & Ryan, 1993, 1996; Ryan & Deci, 2000), it is also possible that unhappy people seek materialistic ways with which to improve and overcome their problems (Dittmar, 2008). For example, research has found that when people perceive threats to their existence, they respond with various strategies. Terror Management Theory states that when reminded of their own mortality, people often seek out mechanisms of enhancing their self-esteem (Solomon, Greenberg, & Pyszczynski, 1991). As a result of this threat, a common strategy for self-protection is to endorse self-enhancing, materialistic values (Crompton & Kasser, 2009). In other words, when people's well-being is diminished, a strategy could be to engage in a materialistic value orientation. Therefore, further longitudinal research needs to be carried out in order to evaluate the directionality of the link between materialism and well-being over time.

Such longitudinal research may also help to shed light on the mechanisms that intervene in the relation between extrinsic, relative to intrinsic, goals and experiences of need satisfaction and need frustration. Although it is maintained within SDT that intrinsic goals create opportunities for need satisfaction, while extrinsic goal-contents interfere with need satisfaction and may even elicit need frustration, the intervening processes in these associations have received little attention (Vansteenkiste et al., 2008). Thus, apart from the more global mechanisms of need satisfaction and need frustration, more specific mechanisms should be examined. For instance, extrinsic and intrinsic goal-contents may, respectively, preclude or foster task-absorption, which, respectively, hampers or contributes to competence development (Vansteenkiste et al., 2004). Further, a focus on extrinsic goals may relate to more frequent and different forms of



interpersonal comparisons (Sebire, Standage, Gillison, & Vansteenkiste, 2013), which may be socially alienating, stressful, and produce a sense of incompetence. Gaining more exact insight in these intervening processes may help to set up and test intervention programs in which adults are trained to become resilient against the negative effects of being exposed to a mass-consumer culture.

**PAPER 2: The Link between Basic Psychological Needs and Well-being:  
Integrating Hedonic and Eudaimonic Research through a Longitudinal Analysis in  
the UK and Chile**

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Reference:

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### **Abstract**

Self-determination theory (SDT) is a theory of eudaimonic well-being. A substantive body of research from SDT has shown through a variety of research designs that the satisfaction of the needs for autonomy, competence and relatedness is linked with higher personal well-being. However, previous research has failed to establish the causal direction of these links. We used a cross-lagged longitudinal design to investigate theorized causal links between need satisfaction and well-being among adults from two different cultures, the UK and Chile. We also used separate measures of need satisfaction and need frustration to explore longitudinally the differential roles of these constructs in predicting positive and negative well-being. We found that in both countries, total need satisfaction was a positive prospective predictor of well-being. Moreover, in the UK, higher well-being was a positive prospective predictor of total need satisfaction. When we split need satisfaction in its three needs, only relatedness reached statistical significance in the UK. In Chile, none of the three needs was an individually significant prospective predictor of well-being. We also found that need satisfaction was a significant prospective predictor of positive well-being in both countries, whereas need frustration was a significant prospective predictor of negative well-being in the UK. Finally, we found a bi-directional positive link between need satisfaction and subjective well-being. Our results point towards a better integration of research into hedonic and eudaimonic well-being.

### **Introduction**

The study of well-being has been characterized by two traditions: the hedonic approach and the eudaimonic one (Keyes, Shmotkin, & Ryff, 2002; Ryan & Deci, 2001). To date, hedonic well-being theories have formed the more extensively studied approach (Gallagher, Lopez, & Preacher, 2009). The hedonic view defines well-being in terms of attaining pleasure and avoiding pain (Ryan & Deci, 2001). Subjective well-being (SWB) is the most studied construct of hedonic well-being (Ryan & Deci, 2001) and reflects what would normally be called “happiness” in normal daily life. SWB “refers to people’s sense of wellness in their lives, in both thoughts and feelings” (Diener & Tay, 2012, p.1) and includes satisfaction with life as well as higher positive affect and lower negative affect (Diener, 1984).

However, according the eudaimonic point of view, well-being does not consist only of happiness and pleasure, or the absence of pain. True well-being should reflect

the actualization of human potentials, meaning and self-realization (Ryan & Deci, 2001). Following this reasoning, the eudaimonic approach defines well-being in terms of being humanly fully functioning (Gallagher et al., 2009; Keyes et al., 2002; Ryan & Deci, 2001).

Ryff and Keyes (1995; Ryff, 1989) explored the concept of eudaimonic well-being in terms of what makes people flourish. Drawing on Aristotle and on human and existentialistic traditions, the authors developed an eudaimonic theory of *psychological well-being* (PWB) through a multidimensional approach (Keyes et al., 2002; Ryan & Deci, 2001). They presented a PWB model which consist of six components: autonomy, environmental mastery, personal growth, positive relations with others, purpose in life, and self-acceptance. This PWB model has been extensively used in eudaimonic research (Gallagher et al., 2009).

Although the two traditions conceptualizing well-being – hedonic and eudaimonic approaches – have evolved separately, attention is increasingly being given to how both approaches are connected (Keyes et al., 2002). For example, from the PWB approach (Ryff, 1989; Ryff & Keyes, 1995) significant and positive correlations have consistently been found between the components of each construct (Keyes et al., 2002). Ryff and Keyes (1995) also found several significant positive associations between the six PWB sub-scales and the measures of SWB, showing that adults who tended to report higher (or lower) levels of PWB also tended to report feeling more (or less) positive affect, less (or more) negative affect and better (or worse) life evaluations. Therefore, it seems that SWB and PWB are related but distinct aspects of positive psychological functioning. Supporting this reasoning, Gallagher et al. (2009) showed that eudaimonic behaviours were associated with improved hedonic well-being, and claimed that SWB and PWB scales strongly covary across time together. However, Keyes et al. (2002) found that even though SWB and PWB may complement each other, they may also compensate for each other. When they are at the same level (for instance, both higher or both lower), SWB and PWB may complement each other, thereby providing a sense of self-congruency. Yet, SWB and PWB may also compensate for each other. A higher SWB may help to maintain positive feelings when PWB is low, or vice-versa.

Although research has shown that PWB and SWB tend to be positively associated, Ryan and Deci (2001) stated that this may not be always the case. For example, conditions that promote SWB do not necessarily lead to higher levels of eudaimonic well-being. Moreover, some aspects of positive functioning (e.g. purpose in

life) require effort and discipline that may go against the search for short-term happiness and pleasure. These issues raise questions about the true direction of the link between hedonic and eudaimonic well-being. Further, it would be necessary not only to understand the causes, consequences and dynamics of both SWB and PWB, but also to find out how they are related to each other (Ryan & Deci, 2001; Ryff, & Keyes, 1995).

According to Keyes et al. (2002), all these arguments open an important area of research in terms of how PWB and SWB might influence each other. The authors hypothesized that PWB could be an antecedent or a consequence of SWB, and emphasized the need for new research exploring cause-effect patterns. Therefore, longitudinal designs are needed in order to understand how SWB and PWB are related (Keyes et al., 2002), and in particular to clarify the causal direction of the relationships between these constructs that have been found in numerous previous correlational studies (Gallagher et al., 2009).

Self-determination theory (SDT; Deci & Ryan, 2000) is another eudaimonic theory of well-being which aims to explain what makes a life worth living. Following Deci and Ryan's (2000) original ideas, just as plants need essential nutrients – such as water, sunlight and minerals – for survival, so people need psychological nutrients for healthy growth and well-being (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000). SDT states that human beings have three basic needs – autonomy, competence and *relatedness* – which would function as the necessary psychological nutrients for well-being, motivation and optimal functioning. *Autonomy* refers to feeling that our behaviour is volitional and meaningful, that we are the initiator of our own actions, that our actions are in accordance with our own values and that the behaviour is endorsed at the highest level of reflection; *competence* refers to feeling effective and efficient in our behaviour, as well as being able to successfully manage difficult challenges; *relatedness* refers to feeling that we are connected, appreciated and understood by others who are important to us through intimate relationships (Reinboth & Duda, 1996; Sheldon & Elliot, 1999; Sheldon & Niemiec, 2006). Therefore, people need to feel that they are able to decide what to do and that these actions are valuable and enjoyable for them (*autonomy*); that they are good at their daily activities (*competence*); and that they have meaningful and deep relationships with others who are important to them (*relatedness*) (Deci & Ryan, 2000; Sheldon & Krieger, 2007).

According to Ryan & Deci (2001), SDT has both similarities and differences with the PWB eudaimonic approach developed by Ryff and Keyes (1995). First, the

concept of autonomy, competence and relatedness have similar meanings in both SDT and PWB approaches. For example, *autonomy* refers to having a sense of self-determination and personal authority; *relatedness* refers to developing and maintaining warm and trusting interpersonal relationships, and *competence* refers to shaping our environment in order to meet our personal needs and desires (Keyes et al., 2002). Second, both approaches understand well-being in terms of being fully functioning. However, an important difference between these two approaches is that whereas the SDT theory see its three needs as the main factors influencing well-being, the PWB model employs them to define well-being (Ryan & Deci, 2001). Nonetheless, all in all, both theories may be conceptualized as theories of human flourishing and eudaimonic well-being.

### **The Link between Basic Need Satisfaction and Well-being**

According to SDT (Deci & Ryan, 2000), the three basic psychological needs (autonomy, competence, and relatedness) would be the three key types of nutrients essential to on-going personal growth, integrity and well-being. However, when these nutrients are unavailable or blocked, people may face dangerous functional costs in terms of their quality of life (Reis, Sheldon, Gable, Roscoe, & Ryan, 2000; Vansteenkiste & Ryan, 2013).

Supporting the claims of SDT, a substantial body of empirical research has shown that the needs for autonomy, competence, and relatedness are significantly associated with personal well-being (Deci & Ryan, 2000; Sheldon & Niemiec, 2006). These results have been found by using different research designs (Sheldon & Niemiec, 2006). For example, people tend to report more positive affect, less negative affect, and more vitality on days when these needs are fulfilled (Reis et al., 2000; Ryan, Bernstein, & Brown, 2010; Sheldon, Ryan, & Reis, 1996; Verstuyf, Vansteenkiste, Soenens, Boone, & Mouratidis, 2013), as well experiencing events that satisfy these needs as more satisfying (Sheldon, Elliot, Kim, & Kasser, 2001; Sheldon & Niemiec, 2006). These results have been obtained in different domains such in sport contexts (e.g., Gagné, Ryan, & Bargmann, 2003; Reinboth & Duda, 2006), in law schools (Sheldon & Krieger, 2007), in the health domain (Williams, McGregor, Zeldman, Freedman, & Deci, 2004), in the workplace (Ryan et al., 2010; Van den Broeck, Vansteenkiste, De Witte, Soenens, & Lens, 2010), and in the education field (e.g., Vlachopoulos, Katartzi, & Kontou, 2011), as well across the life span (Kasser & Ryan, 1999; Niemiec, Lynch,

Vansteenkiste, Bernstein, Deci, & Ryan, 2006). Notably, the link between need satisfaction and well-being has been found in several different cultures (e.g., Chirkov, Ryan, & Willness, 2005; Deci, Ryan, Gagné, Leone, Usunov, & Kornazheva, 2001; Sheldon et al., 2001; Taylor & Lonsdale, 2010).

Despite the substantial amount of research exploring the link between need satisfaction and well-being, the great majority of previous studies have employed correlational designs, which do not allow inferences about cause-effect relations. Only a few studies have tried to tackle this important problem through longitudinal designs, but most of these have still not used designs that are sensitive to establishing causal precedence. Below we will present a brief summary of the relevant literature.

**Concurrent designs.** Several studies in SDT have measured concurrent associations between within-person changes in need satisfaction and changes in well-being over time. For example, using a diary study methodology among US undergraduates, Sheldon, Ryan, & Reiss (1996) examined the link between the needs for competence and for autonomy and daily well-being across 14 days during an academic term. They found that, on days when participants reported higher competence fulfilment, they also tended to report higher overall well-being, as well higher positive affect, lower negative affect, and higher vitality. Similarly, higher autonomy satisfaction was associated over time with higher overall well-being, as well with higher positive affect and lower negative affect.

Among US university students, Reis et al. (2000) explored to what extent daily variation in the satisfaction of the three needs would predict daily variations in well-being (moods, vitality and symptoms). Participants provided daily reports for 14 days on well-being and need satisfaction (autonomy, competence and relatedness). Through hierarchical linear models (HLM) across 2 weeks of daily activity, the authors found that on the day level (which controlled for both average levels of wellbeing and the prior day's outcomes), the composite well-being measure related significantly to all the three needs. Moreover, higher levels of competence and relatedness satisfaction were associated with higher positive affect and vitality.

Gagné et al. (2003) studied young US female gymnasts between the ages of 7 to 18, and explored how variations in experiences of autonomy, competence and relatedness in gymnastics affected changes in well-being. In order to do so, they recorded day-to-day experiences of need satisfaction and well-being for a total of 15 practices that spanned a period of 4 weeks. Using HLM, they found that increases in

daily need satisfaction predicted increases in daily positive affect, vitality and self-esteem, but not in negative affect.

Among US university students and using a short-period longitudinal design (3 months), Sheldon and Niemiec (2006) explored the associations between well-being (positive and negative affect, life satisfaction and happiness) and need satisfaction. In Study 3, the authors examined their hypotheses using a daily diary methodology where participants rated the need satisfaction and wellbeing that they experienced during the previous 24 hours at eight different times during a college semester. It was found that all three needs had significant relations to day-level fluctuations in well-being.

Ryan et al. (2010) explored the effects of weekend versus weekday and work versus non-work experiences on several well-being indicators (positive and negative affect, vitality, physical symptoms) among a sample of working adults. Participants monitored their experiences 3 times daily for 21 consecutive days. It was found that the link between weekend and non-work activities and well-being was mediated by the satisfaction of the needs for autonomy and relatedness. For example, autonomy and relatedness together fully mediated the ‘weekend effect’ on negative affect; autonomy and relatedness together only partially mediated the weekend effect on both positive affect and vitality; and autonomy alone partially mediated the weekend effect on physical symptoms.

Finally, using a daily diary methodology among Belgian adolescents, Verstuyf et al. (2013) explored whether the daily satisfaction and frustration of the basic psychological needs for autonomy, competence and relatedness is associated with daily binge eating symptoms over a 14-day period. Within-person analysis revealed that need frustration had a significant positive association with binge eating symptoms, whereas need satisfaction was unrelated. After splitting the need frustration composite score into its subcomponents, it was found that frustrations of the relatedness, autonomy and competence needs were all associated positively with binge eating symptoms. However, need frustration one day did not predict an increase in binge eating symptoms the next day and binge eating symptoms on one particular day did not predict increases in need frustration the next day.

The studies reviewed above have shown that people tend to report more positive affect, less negative affect, and more vitality on days when their needs are fulfilled (Reis et al., 2000; Ryan et al., 2010; Sheldon & Niemiec, 2006; Sheldon et al., 1996; Verstuyf et al., 2013) highlighting the association between higher need satisfaction and higher



well-being. However, for the most part these studies have tested only contemporaneous relationships between need satisfaction and well-being, which does not allow one to determine causality between the core variables. Therefore, research using prospective designs is needed in order to disentangle the correct direction of these links.

**Prospective designs.** A few studies have tested whether higher need satisfaction at a given time-point is a prospective predictor of higher well-being at a later time-point. For example, Sheldon & Elliot (1999) developed a self-concordance model to understand how autonomy relates to well-being. They asked US undergraduates students to complete measures of well-being (positive and negative affect and life satisfaction) at the beginning and at the end of an academic semester. In addition, students were asked to complete a baseline measure of need satisfaction at the beginning of the semester, as well as to rate their on-going experiences of autonomy, competence and relatedness three times during the academic term. The authors found that the link between goal attainment and well-being was mediated by daily activity-based experiences of autonomy, competence and relatedness that the students accumulated during the period of striving. It was therefore concluded that the accumulation of these three needs over time would lead to an increase in longitudinal well-being. However, an important limitation arises in this research. The authors conducted regression and SEM models in which all three accumulative needs (measured during the semester) were entered together, along with well-being measured at the beginning of the term, as predictors of well-being at the end of the semester. Yet, the authors did not measure well-being at the same time as the accumulative need experiences, and therefore this variable was not controlled for—which is a key requirement for appropriate prospective studies (Schlueter, Schmidt, & Wagner, 2008).

Reinboth and Duda (1996) conducted a field correlational longitudinal design among a sample of British university athletes in order to explore the link between changes in well-being (vitality and physical symptoms) and changes in need satisfaction over the course of 5 months of sport practices. Data were collected at two time points: earlier in the season and a few weeks before the end of the seasons. The authors found that the satisfaction of the internal perceived locus of causality component of the need for autonomy and coach relatedness across the course of the season were significant predictors of increased feelings of subjective vitality during daily activities. Despite its important findings, the study was conducted only in a specific sport context, and using only measures of mental and physical health for assessing well-being.

Among US students, Sheldon and Niemiec (2006) conducted a short-term longitudinal design to assess well-being both at the beginning and at the end of a college semester and attempted to predict changes in well-being during that period. However, none of the three needs was an individually significant prospective predictor of well-being in the change analyses.

Gagné et al. (2013) explored prospectively the effects of young athletes' perceptions of support from coaches and parents on their need satisfaction, motivation, and well-being. The authors tested how variations in the satisfaction of the three needs affected changes in well-being from before to after a practice over a 4-week period. It was found that increases in daily need satisfaction predicted increases in positive affect, vitality, and self-esteem. However, need satisfaction did not affect negative affect.

Finally, through a 3-year prospective study in a specific setting among law students, Sheldon and Krieger (2007) explored the relationships between well-being (positive and negative affect and life satisfaction), values and motivation of US university students. Using hierarchical regression, the authors found that changes in need satisfaction of the needs for autonomy, competence and relatedness significantly predicted subsequent changes in subjective well-being.

All the previous mentioned prospective designs have shown important findings. However, most of them are using changes in need satisfaction to predict future changes in well-being, which do not allow to test the causal direction between the core variables. Moreover, none of them has been able to report a successful cross-lagged model where need satisfaction is represented as a causal antecedent and/or consequence of well-being, which is a key requirement for the establishment of cause-effect associations (Finkel, 1995; Schlueter et al., 2008)

Therefore, SDT (Deci & Ryan, 2000) has tried to establish cause-effect patterns between the satisfaction of the three need satisfaction (three aspects of eudaimonic well-being) and different aspects of well-being such as SWB and mental and physical health. However, previous SDT studies do not allow one to infer causality between these core variables. A common limitation in SDT studies is to assume that need-satisfying (or frustrating) experiences precede well-being (or ill-being). Nonetheless, the causality may be the reverse (Verstuyf et al., 2013). Thus, the possible bi-directional link between need satisfaction and well-being has not yet been explored in detail. To date, only one longitudinal paper (Verstuyf et al., 2013) has explored the bi-directional link, but only in a specific eating behaviour context in a student sample. In our paper we aim to fill

these research gaps by using a cross-lagged longitudinal design that is better suited to disentangling the correct causal direction of these links.

To sum up, by studying the longitudinal relationship between need satisfaction (three different aspects of eudaimonic well-being) and well-being, we will be able to disentangle the correct statistical direction of the link. It will also allow us to integrate hedonic and eudaimonic approaches consistently.

### **The Additional Role Played by Basic Psychological Need Frustration**

Very recently, it has been argued that people's tendencies towards both well-being and ill-being may not be explained by basic psychological need satisfaction alone. Need *frustration* can play a key negative role by being extremely harmful. To continue with the SDT metaphor, Vansteenkiste and Ryan (2013) argue that if plants do not receive their nutrients (low need satisfaction), they will die over time. However, if salt water is thrown onto plants (need frustration), they will die sooner. Further, the lack of need fulfilment does not necessarily entail the experience of need frustration, but need frustration does imply that the fulfilment of the needs becomes blocked because the latter would involve a more active obstruction of the psychological needs (Unanue, Dittmar, Vignoles, & Vansteenkiste, 2013). In fact, a number of studies have found that lower levels of need satisfaction were unrelated to negative well-being outcomes (Cordeiro, Paixão, Lenes, & Silva, 2013; Gagné et al., 2003). Importantly, research has shown that need satisfaction and need frustration represent distinct factors (e.g., Sheldon & Gunz, 2009; Sheldon & Hilpert, 2012).

Although most studies in the SDT literature so far tap into the satisfaction of basic needs, increasing empirical attention has been given in recent years to the topic of need frustration (Unanue et al., 2013; Vansteenkiste & Ryan, 2013). For example, Sheldon and Gunz (2009) explored need satisfaction and need frustration in relation to need-relevant motivations. The authors found that the frustration of the psychological needs is associated with a higher desire to reduce need frustration, but that need satisfaction does not reduce the desire to satisfy the needs. Sheldon, Abad, & Hinsch (2011) studied the association between the use of Facebook, and the satisfaction and dissatisfaction of the basic psychological needs. It was found that more frequent Facebook usage correlates with more relatedness satisfaction and with more relatedness frustration. Sheldon (2011) explored the role of need satisfaction and need frustration on the behavioural-motive and experiential-reward aspects of needs. The authors found that need satisfaction and need frustration tap into two different constructs and correspond to

the separable behavioural-motive and experiential-reward aspects of needs.

Bartholomew, Ntoumanis, Ryan, & Thøgersen-Ntoumani (2011) found that need satisfaction related especially to positive outcomes whereas need frustration related to maladaptive ones. Stebbings, Taylor, Spray, & Ntoumanis (2012) replicated these findings among sports coaches. Employing an objective marker of psychobiological functioning, Bartholomew, Ntoumanis, Ryan, Bosch, & Thøgersen-Ntoumani (2011) found that need frustration (but not need satisfaction) was related to higher levels of immunological problems. Verstuyf, Vansteenkiste, and Soenens (2012) showed that need frustration could account for the link between dieting to achieve physical attractiveness and bulimic symptoms. Finally, Verstuyf et al. (2013) showed that the daily fluctuation in psychological need frustration but not in need satisfaction was associated with daily variation in negative well-being (assessed in terms of bulimic symptoms), but not with positive outcomes.

Therefore, this still small but growing body of literature seems to show that need satisfaction would be associated with more positive outcomes and need frustration with more negative outcomes (Verstuyf et al., 2013). Following these ideas, Vansteenkiste and Ryan (2013) hypothesized that it would be possible to find stronger paths from need satisfaction to positive well-being and from need frustration to negative well-being, but also weaker cross-paths.

In our research, we aim to extend this small body of literature by examining the unique roles of psychological need satisfaction and need frustration in predicting both positive and negative well-being, using longitudinal data from two different adult samples from the UK and Chile. To date, according to our knowledge, there are no longitudinal studies that have distinguished need satisfaction and need frustration when exploring causality between these core variables. We used a need satisfaction/need frustration balanced scale (Sheldon & Gunz, 2009) to test longitudinally our core associations. According to Sheldon and Hilpert (2012), an appropriate need satisfaction scale needs to be balanced in terms of the numbers of questions for the three needs as well as requiring the inclusion of a similar number of positively and negatively worded items. Yet, in most of the previous studies, need-satisfaction has been measured in a variety of different ways and contexts without paying attention to this issue (Sheldon & Hilpert, 2012). Considering these measurement problems, Sheldon and Gunz (2009) built an alternative measure, the Balanced Measure of Psychological Needs, which addresses the methodological shortcomings mentioned above. Notably, only one of the

previous longitudinal studies exploring longitudinally the link between need satisfaction and well-being (Verstuyf et al., 2013) employed a balanced scale, which means that the remaining previous studies did not tackle possible response and method artefacts (Sheldon & Hilpert, 2012).

### **The Present Research**

As stated previously, longitudinal research on the link between need satisfaction and well-being has some important gaps. The most important one is that most of the previous studies do not allow causality between the core variables to be inferred. In our research, we explored the bi-directional links between need satisfaction/need frustration and well-being through a more comprehensive longitudinal cross-lag model, in order to disentangle the causal direction of the associations, and thus help to integrate insights from hedonic and eudaimonic approaches to well-being. We tested our predictions among graduate adults from two different cultures – the UK and Chile – over a three-year period, assessing more comprehensive well-being measures than research so far. Moreover, we used a balanced need satisfaction/need frustration scale (Sheldon & Gunz, 2009) to test longitudinally our core predictions.

### **Hypotheses**

Based on the literature presented above, we tested the following hypotheses for the UK and Chile:

(H1) Basic psychological need satisfaction is a prospective predictor of higher well-being.

(H2) Well-being is a prospective predictor of higher basic psychological need satisfaction.

(H3) The satisfaction of the needs for autonomy, competence and relatedness are unique prospective predictors of higher well-being.

(H4) Well-being is a prospective predictor of higher satisfaction of the needs for autonomy, competence and relatedness.

(H5) Basic psychological need satisfaction is a prospective predictor of higher positive well-being

(H6) Basic psychological need satisfaction is a prospective predictor of lower negative well-being.

(H7) Basic psychological need frustration is a prospective predictor of lower positive well-being.

(H8) Basic psychological need frustration is a prospective predictor of higher negative well-being.

(H9) Positive well-being is a prospective predictor of both higher basic psychological need satisfaction and lower basic psychological need frustration.

(H10) Negative well-being is a prospective predictor of both lower basic psychological need satisfaction and higher basic psychological need frustration.

## **Method**

### **Participants and Procedure**

Data were obtained through a three-wave longitudinal survey (2010, 2011 and 2012). In 2010 (Wave 1), UK and Chilean citizens were invited to participate in a research project by completing an online survey. Respondents were sent an introductory email containing a brief description of the study along with a web link to the survey. They were also informed that the project was part of a longitudinal study and their consent for future surveys (Waves 2 and 3) was sought. Subsequent e-mails were sent only to those who had agreed to continue participating.

Among the British sample, 461 adults (48.12% of time 1; 59% female) ranging in age from 20 to 77 years (Mean = 45.14;  $SD = 14.06$ ) completed all 3 waves. Nine-hundred and fifty eight UK participants completed Wave 1, 594 completed Wave 2 and 610 completed Wave 3. Among the Chilean sample, 76 adults (29.6% of time 1; 47% female) ranging in age from 22 to 71 years (Mean = 36.87;  $SD = 10.21$ ) completed all 3 waves. Two-hundred and fifty seven participants completed Wave 1, 115 completed Wave 2 and 114 completed Wave 3. Using full maximum likelihood estimation in all our analyses, 958 participants from the UK and 257 participants from Chile were included.

The study was conducted according to BPS and APA guidelines. All participants provided their written consent and were informed that they could withdraw from the study at any point. The purpose of the research was described in broad terms (hence no deception was involved), and respondents were given the opportunity to receive a summary of the research findings.

The questionnaire was translated into Spanish for the Chilean participants, and equivalence of meaning with the English version was checked through established back-translation procedures (Brislin, 1970).

### **Measures**

**Basic need satisfaction and basic need frustration.** Following Verstuyf et al. (2013) we used a balanced measure developed by Sheldon and Gunz (2009) to assess need satisfaction and frustration. This scale consisted of 18 items; that is, 6 items per need, 3 of which tapped into satisfaction and 3 of which tapped into frustration of the relevant need. Psychometric properties, as well as distinctiveness between satisfaction and frustration, were demonstrated by Sheldon and Hilpert (2012) and Cordeiro et al. (2013). Participants rated on a 6-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (6) whether they felt their needs for autonomy (e.g., “My choices expressed my “true self” or “There were people telling me what I had to do”), competence (“I was successfully completing difficult tasks and projects” or “I experienced some kind of failure, or was unable to do well at something”) and relatedness (“I felt a sense of contact with people who care for me, and whom I care for” or “I was lonely”) were satisfied or frustrated. Reliabilities were measured at Wave 1, Wave 2 and Wave 3 and for each separate need as well as for the aggregated measures of need satisfaction and need frustration and for the total need satisfaction score (including both the satisfaction and frustration items). The composite *total need satisfaction* scale had reliabilities of .86, .87 and .88 in the UK and .83, .81 and .88 in Chile in each wave respectively. Cronbach’s alphas for the measure of need satisfaction (only satisfaction items) had reliabilities of .84, .86 and .85 in the UK and .81, .83 and .89 in Chile in each wave respectively. Cronbach’s alphas for the measure of need frustration (only frustration items) had reliabilities of .81, .82 and .82 in the UK and .79, .74 and .80 in Chile in each wave respectively. The individual needs (including both the satisfaction and frustration items) for autonomy, competence, and relatedness had the following reliabilities in each wave respectively: autonomy, .77, .78, .79 (UK) and .68, .69, .77 (Chile); competence, .76, .77, .78 (UK) and .69, .56, .75 (Chile); relatedness, .75, .77, .78 (UK) and .60, .61, .72 (Chile). Although most measures had sufficient reliability, the effects of the three needs in Chile should be interpreted with some caution as Cronbach’s alpha revealed low internal consistency on some waves.

**Well-being.** We employed six scales assessing a wide array of well-being dimensions, including measures typically used to assess subjective well-being (life satisfaction, positive affect and negative affect), as well as mental (depression and subjective vitality) and physical health measures.

**Satisfaction with life.** We used the 5-item *Satisfaction with Life Scale* developed by Diener, Emmons, Larsen, & Griffin (1985) to measure the cognitive component of

subjective well-being. Examples items are *In most ways my life is close to my ideal* and *The conditions of my life are excellent*. Participants rated these statements on a 6-point Likert-type scale ranging from *strongly disagree* (1) to *strongly agree* (6). Cronbach's alphas for the three waves were .87, .87 and .90 in the UK and .87, .87 and .92 in Chile respectively.

**Positive and negative affect.** We used the 10-item measure *International Positive and Negative Affect Schedule Short Form* (I-PANAS-SF; Thompson, 2007), which includes separate subscales measuring positive affect (5 items) and negative affect (5 items). Example items asked participants how frequently they have felt *inspired*, *alert*, *upset* and *nervous* during the last month. Participants rated these questions on a 5-point scale ranging from *never* (1) to *always* (5). Cronbach's alphas for positive affect were .79, .80 and .81 in the UK and .72, .73 and .71 in Chile respectively. The internal reliability for negative affect were .77, .76 and .76 in the UK and .72, .62 and .73 in Chile respectively.

**Vitality.** We employed the *Subjective Vitality scale* (Ryan & Frederick, 1997), a 7-item measure developed to evaluate how alive and alert people have been feeling during the last month. Participants rated their agreement with statements such as *I feel alive and vital* and *I don't feel very energetic*, on a 7-point response scale from *not at all true* (1) to *very true* (7). Cronbach's alphas for the three waves were .91, .91 and .92 in the UK and .87, .87 and .92 in Chile respectively.

**Depressive symptoms.** We employed a slightly shortened version (16 items) of the *Centre for Epidemiological Studies-Depression Inventory* (CES-D; Radloff, 1977) measure, designed to obtain an individual global depression score in non-clinical samples. Example items are: *I did not feel like eating*, *My appetite was poor*, and *I felt that I couldn't stop feeling down even with help from my family or friends*. Participants rated these statements on a 4-point scale ranging from *rarely or none of the time* (0) to *most or all of the time* (3). Cronbach's alphas for the three waves were .89, .90 and .90 in the UK and .89, .88 and .93 in Chile respectively.

**Physical symptoms of ill-health.** We employed seven items from the *General Health Questionnaire* developed by Goldberg et al (1997) to obtain a measure of participants' global health. For the purpose of this study, only part A (7 items) of the original scale was used, in order to focus on physical symptoms. Participants responded to questions such as how often they had recently been *feeling in need of a good tonic* or *feeling run down and out of sorts* on a 5-point scale from *never* (1) to *always* (5).



Cronbach's alphas for the three waves were .84, .83 and .84 in the UK and .81, .82 and .81 in Chile respectively.

## Results

All the constructs of interest were measured at T1 (2010), T2 (2011) and T3 (2012). Descriptive statistics and inter-correlations for all the study variables are shown in Appendix 2 (Table 2.1, UK; Table 2.2, Chile). We used autoregressive cross-lagged models (Finkel, 1995) for testing our causal hypotheses, where each construct was regressed on both its own lagged score as well as on the lagged scores of the other constructs.

In initial analyses, we controlled for age and gender in the UK<sup>3</sup>. However, including these variables did not significantly affect either the structural relationships between the latent constructs or the results of the main predictions. Therefore, for simplicity, we reported our results without these control variables.

### Plan of analysis

We employed structural equation modelling (Mplus 6.0) to assess our main hypotheses. Our predictions were tested in three phases. Firstly, we explored the link between total basic psychological need satisfaction and well-being. Secondly, we explored the differential hypothesized role played by psychological need satisfaction and psychological need frustration in both positive and negative well-being. Finally, we explored the bi-directional link between total need satisfaction and subjective well-being, aiming to integrate hedonic and eudaimonic approaches.

**Phase 1: The link between basic psychological need satisfaction and well-being.** First, in Model 1 we explored the association between need satisfaction and well-being. We modelled both constructs as latent variables. In order to proceed, we created a *total latent variable* measure for assessing *total* basic need satisfaction, using autonomy, competence and relatedness needs as indicators. Each indicator was built by averaging its *satisfaction* mean score and its *frustration* mean score (reversed). For example, the autonomy indicator was built by averaging autonomy satisfaction and autonomy frustration (reversed). We also created a latent variable for personal well-being, using its six indicators (life satisfaction, positive affect, negative affect, depressive symptoms, vitality and physical symptoms of ill-health). In Model 2, we

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<sup>3</sup> Due to the smaller Chilean sample size, this model caused problems in estimation, and so it was not possible to control for these variables in Chile.

decided to split the total need satisfaction measure into its three distinctive needs and modelled our constructs as observed variables<sup>4</sup>. In Model 2 we created a *total well-being indicator*. Following the logic of well-being research and several studies in the SDT field (Reis et al., 2000; Sheldon & Elliot, 1999; Sheldon & Krieger, 2007; Sheldon & Niemiec, 2006), this variable was built by standardizing the life satisfaction, the positive affect, the vitality, the depressive symptoms (reversed), the negative affect (reversed) and the physical symptoms (reversed) scales and then averaging them. Therefore, higher scores in this variable imply higher levels of well-being.

***Model 1: The link between total need satisfaction and well-being***

*UK sample.* In Model 1 (Figure 2.1), we tested our hypothesis about the link between total basic psychological need satisfaction and well-being. We started with a structural cross-lagged reciprocal model for our core variables. By doing so, we allow all the constructs to be represented as causal antecedents and/or consequences of all other constructs. In order to control for metric invariance, we constrained all the factor loadings to be equal across the waves. We followed the same procedure in all our further models. We incorporated auto-correlated error terms for the observed indicators of our latent variables as suggested by Jöreskog (1979) and Schlueter et al. (2008). We also allowed negative affect and depressive symptoms to covary within T1.

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<sup>4</sup> Due to the high correlation between the three needs that may lead to suppression effects if we employ latent variables, we decided to model all of them as observed variables. The correlations between autonomy and competence were as follows: Wave 1 (UK:  $r = .46, p < .001$ ; Chile:  $r = .60, p < .001$ ), Wave 2 (UK:  $r = .51, p < .001$ ; Chile:  $r = .49, p < .001$ ) and Wave 3 (UK:  $r = .46, p < .001$ ; Chile:  $r = .75, p < .001$ ). The correlations between autonomy and relatedness were as follows: Wave 1 (UK:  $r = .47, p < .001$ ; Chile:  $r = .42, p < .001$ ), Wave 2 (UK:  $r = .55, p < .001$ ; Chile:  $r = .49, p < .001$ ) and Wave 3 (UK:  $r = .55, p < .001$ ; Chile:  $r = .56, p < .001$ ). The correlations between relatedness and competence were as follows: Wave 1 (UK:  $r = .47, p < .001$ ; Chile:  $r = .55, p < .001$ ), Wave 2 (UK:  $r = .49, p < .001$ ; Chile:  $r = .55, p < .001$ ) and Wave 3 (UK:  $r = .50, p < .001$ ; Chile:  $r = .53, p < .001$ ). We will follow the same reasoning in Models 3 and 4.

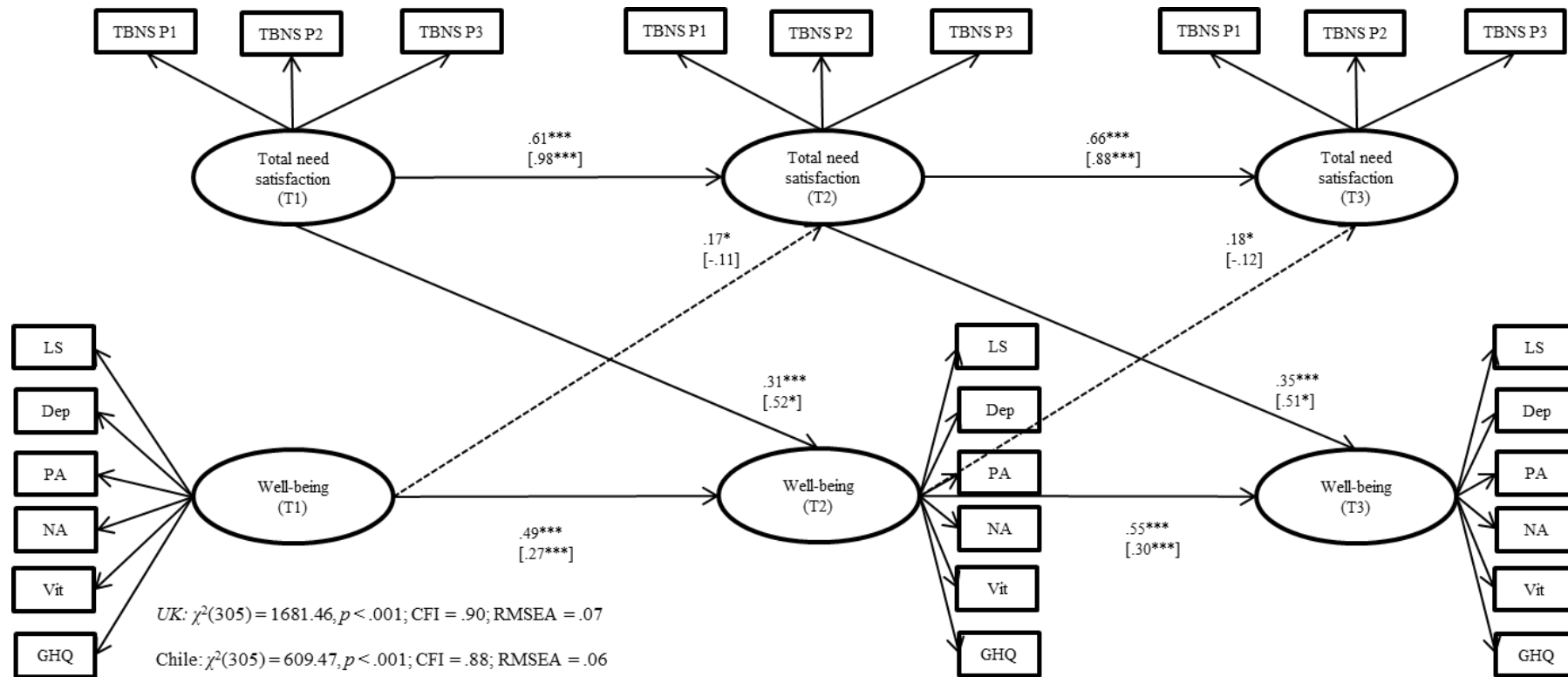


Figure 2. 1: Model 1. Structural model for the associations between total basic need satisfaction (including the satisfaction and the frustration items) and well-being in the UK and Chile.

Note: Coefficients shown are standardized paths. Chilean coefficients are in brackets. Error terms, loadings and covariances are not shown to enhance visual clarity. TBNS = total basic need satisfaction. Pi = parcel i; LS = Life Satisfaction; Dep = depressive symptoms; PA = positive affect; NA = negative affect; Vit = vitality; GHQ = Negative Physiological Symptoms. Solid lines = significant/marginal paths in both countries. Dotted lines = significant/marginal paths only in one country. Paths are only shown when at least one country reach significance or marginal significance. †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

To gain statistical power for our hypothesis tests, and because we did not expect differences in the path trajectories across waves, we constrained all the corresponding lagged paths to be equal between T1 and T2 and between T2 and T3 within each country. Hence, each of our hypotheses is represented by a single parameter test representing the combined effect from H1 to H2 and from H2 to H3. We followed the same procedure in all further models<sup>5</sup>.

In Model 1 and in all further models we followed Kline's (2005) criteria for assessing model fit: RMSEA values of  $\leq .05$  indicate close approximate fit; values between .05 and .08 suggest a reasonable error of approximation, and values above .10 are not acceptable. CFI values greater than .90 indicate an acceptable fit and values greater than .95 indicate a good fit.

Model 1 results revealed an acceptable model fit,  $\chi^2(305) = 1681.46, p < .001$ , CFI = .90 and RMSEA = .07. All our latent variables had acceptable loadings, ranging from .62 to .84 in Wave 1, from .73 to .84 in Wave 2, and from .58 to .85 in Wave 3.

In the UK, Model 1 results showed that total basic need satisfaction was a significant and positive prospective predictor of well-being,  $\beta = .31, p < .01$ . We also found that well-being was a significant positive prospective predictor of basic need satisfaction,  $\beta = .17, p < .05$ .

*Chilean sample.* We replicated the same model and the same procedure in Chile (Figure 2.1). The model fit showed a marginally acceptable model fit,  $\chi^2(305) = 69.47, p < .001$ , CFI = .88 and RMSEA = .06. All our latent variables in Chile had acceptable loadings, ranging from .49 to .71 in Wave 1, from .61 to .82 in Wave 2, and from .62 to .85 in Wave 3.

In Chile, Model 1 showed that total basic need satisfaction was a significant positive prospective predictor of well-being,  $\beta = .52, p < .05$ , but the reversed effect did not reach significance,  $\beta = -.11, p = .54$ .

### ***Model 2: The link between autonomy, competence and relatedness and well-being***

*UK sample.* In Model 2 (Figure 2.2), we explored the unique role played by the three needs (autonomy, competence and relatedness) on well-being. First, we set up a four-factor cross-lagged model. We allowed our variables to covary within each time

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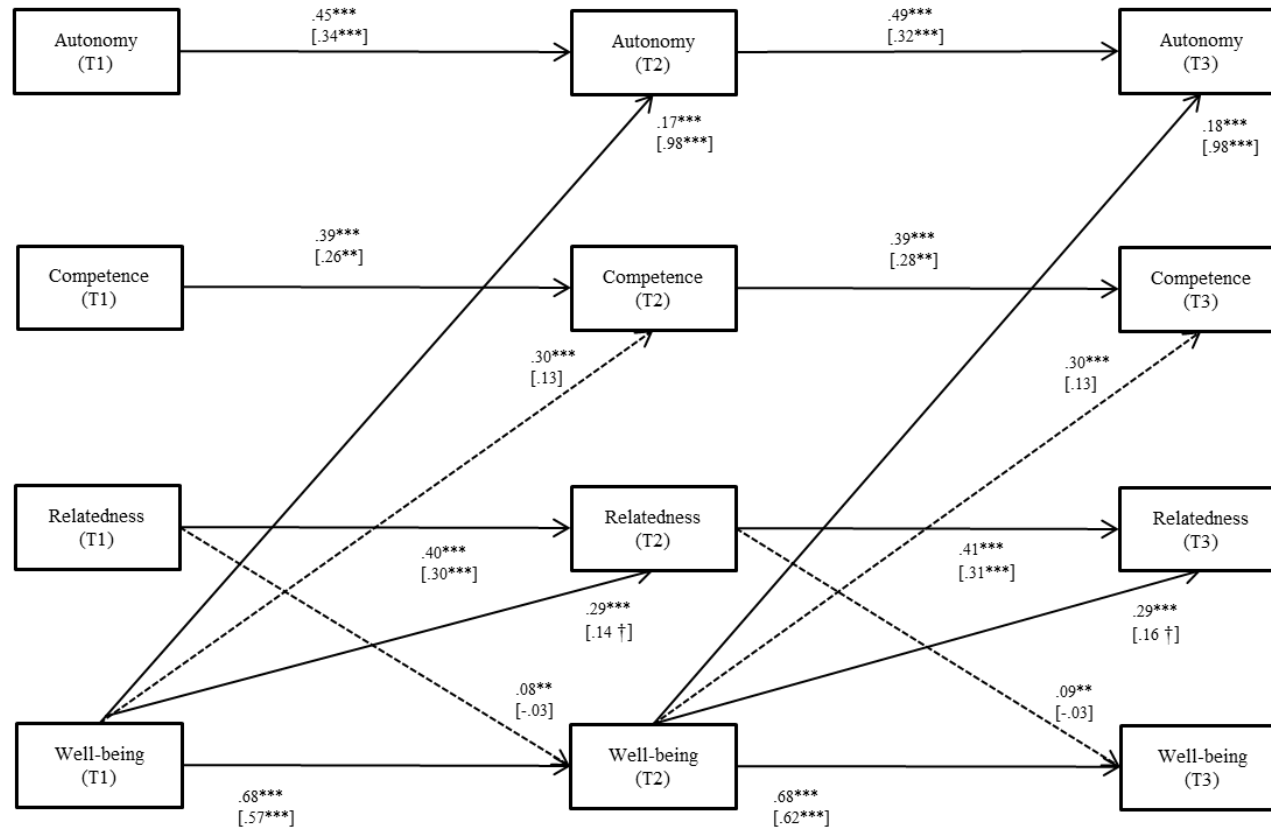
<sup>5</sup> Although the unstandardized paths were constrained to equality, the corresponding standardized paths may differ slightly. For simplicity, in the main text we report the standardized paths from T1 to T2. Paths from T2 to T3 may be found in the respective figures.

point. The results demonstrated an acceptable model fit,  $\chi^2(32) = 224.03, p < .001$ , CFI = .95 and RMSEA = .08.

In the UK, Model 2 showed that only the need for relatedness ( $\beta = .08, p < .001$ ) was a significant positive prospective predictor of well-being. The needs for autonomy ( $\beta = .03, p = .18$ ) and the need for competence ( $\beta = .01, p = .61$ ) did not reach significance. However, we found that well-being was a significant positive prospective predictor of the needs for autonomy ( $\beta = .17, p < .001$ ), competence ( $\beta = .30, p < .001$ ) and relatedness ( $\beta = .29, p < .001$ ).

*Chilean sample.* We followed the same procedure in the Chilean sample (Figure 2.2). The results demonstrated an marginally acceptable model fit,  $\chi^2(32) = 92.25, p < .001$ , CFI = .90 and RMSEA = .09.

In Chile, none of the three needs was an individually significant prospective predictor of well-being (autonomy,  $\beta = .10, p = .15$ ; competence,  $\beta = .10, p = .20$ ; relatedness,  $\beta = -.03, p = .65$ ). However, we found that well-being was a significant positive prospective predictor of the need for autonomy ( $\beta = .26, p < .001$ ) and a marginal positive prospective predictor of the need for relatedness ( $\beta = .14, p = .07$ ). The link between well-being and the need of competence did not reach statistical significance,  $\beta = .13, p = .13$ .



UK:  $\chi^2(32) = 224.03, p < .001$ ; CFI = .95; RMSEA = .08; Chile:  $\chi^2(32) = 92.25, p < .001$ ; CFI = .90; RMSEA = .09

Figure 2. 2: Model 2. Structural model for the associations between the needs for autonomy, competence and relatedness (including the satisfaction and the frustration items) and well-being in the UK and Chile

Note: Coefficients shown are standardized paths. Chilean coefficients are in brackets. Error terms and covariances are not shown to enhance visual clarity. Solid lines = significant/marginal paths in both countries. Dotted lines = significant/marginal paths only in one country. Paths are only shown when at least one country reach significance or marginal significance. †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Phase 2: The link between basic psychological need satisfaction, basic psychological need frustration and positive and negative well-being.** In this section, we aim to explore the differential hypothesized role played by psychological need satisfaction and psychological need frustration in both positive and negative well-being. Following Vansteenkiste and Ryan (2013), we predicted that need satisfaction would be primarily associated with growth and wellness, and need frustration primarily with malfunctioning and ill-being, but we also expect to observe weaker cross-paths. Therefore, in Model 3 we tested the differential role played by basic need satisfaction and basic need frustration in positive and negative well-being.

We modelled all constructs in this phase as observed variables<sup>6</sup>. Basic need satisfaction and basic need frustration were computed using means of the relevant items. To test our expectation that the need satisfaction scale would be more predictive of positive well-being outcomes whereas the need frustration scale would be more predictive of negative well-being outcomes, we modelled positive and negative well-being as two different constructs. Following the logic of subjective well-being research and several studies in the SDT field (Reis et al., 2000; Sheldon & Elliot, 1999; Sheldon & Krieger, 2007; Sheldon & Niemiec, 2006), we created an aggregate positive well-being score by standardizing the life satisfaction, the positive affect and the vitality scales and then averaging them (each of the three scales was equally weighted). We followed the same procedure to create a negative well-being measure by standardizing and then averaging the depressive symptoms, the negative affect and the physical symptoms of ill-health standardized scores.

***Model 3: The link between basic need satisfaction, basic need frustration and positive and negative well-being***

*UK sample.* First, we set up a four-factor cross-lagged model (Figure 2.3). We allowed our variables to covary within each time-point. The results showed a marginally acceptable model fit,  $\chi^2(32) = 231.40, p < .001$ , CFI = .96 and RMSEA = .08.

In the UK, Model 3 showed that basic need satisfaction was a significant positive prospective predictor of positive well-being,  $\beta = .15, p < .001$  and need

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<sup>6</sup> As in Model 2, due to the high correlation between our main constructs that may lead to suppression effects if we employ latent variables, we decided to model all of them as observed variables. The correlations between positive and negative well-being were as follows: Wave 1 (UK:  $r = -.63, p < .001$ ; Chile:  $r = -.58, p < .001$ ), Wave 2 (UK:  $r = -.63, p < .001$ ; Chile:  $r = -.60, p < .001$ ) and Wave 3 (UK:  $r = -.65, p < .001$ ; Chile:  $r = -.75, p < .001$ ). The correlations between need satisfaction and need frustration were as follows: Wave 1 (UK:  $r = -.43, p < .001$ ; Chile:  $r = -.47, p < .001$ ), Wave 2 (UK:  $r = -.46, p < .001$ ; Chile:  $r = -.33, p < .001$ ) and Wave 3 (UK:  $r = -.54, p < .001$ ; Chile:  $r = -.44, p < .001$ ).

frustration was a significant positive prospective predictor of negative well-being,  $\beta = .10, p < .01$ .

We did not find a significant link either between need frustration and positive well-being or between need satisfaction and negative well-being.

We also found that positive well-being ( $\beta = .21, p < .001$ ) and negative well-being ( $\beta = -.10, p < .01$ ) were both significant prospective predictors of basic need satisfaction.

Finally, we found that negative well-being was a significant prospective predictor of both basic need frustration ( $\beta = .29, p < .001$ ) and of positive well-being ( $\beta = -.09, p < .01$ ).

*Chilean sample.* We replicated Model 3 In Chile (Figure 2.3), following the same procedure than in the UK. We allowed our variables to covary within each time-point. We also allowed negative well-being between T1 and T3 and positive well-being between T2 and T3 to co-vary. Model 3 showed a marginally acceptable model fit,  $\chi^2(30) = 93.30, p < .001$ , CFI = .91 and RMSEA = .09.

In Chile, Model 3 showed that basic need satisfaction was a significant positive prospective predictor of positive well-being,  $\beta = .15, p < .05$ . Moreover, need satisfaction was a significant positive prospective predictor of negative well-being,  $\beta = -.15, p < .05$ . In addition, need satisfaction was a significant prospective negative predictor of need frustration,  $\beta = -.19, p < .05$ . Finally, we found that negative well-being was a significant prospective positive predictor of need frustration,  $\beta = .27, p < .05$ , as well as a significant negative prospective predictor of positive well-being,  $\beta = -.14, p < .05$ .



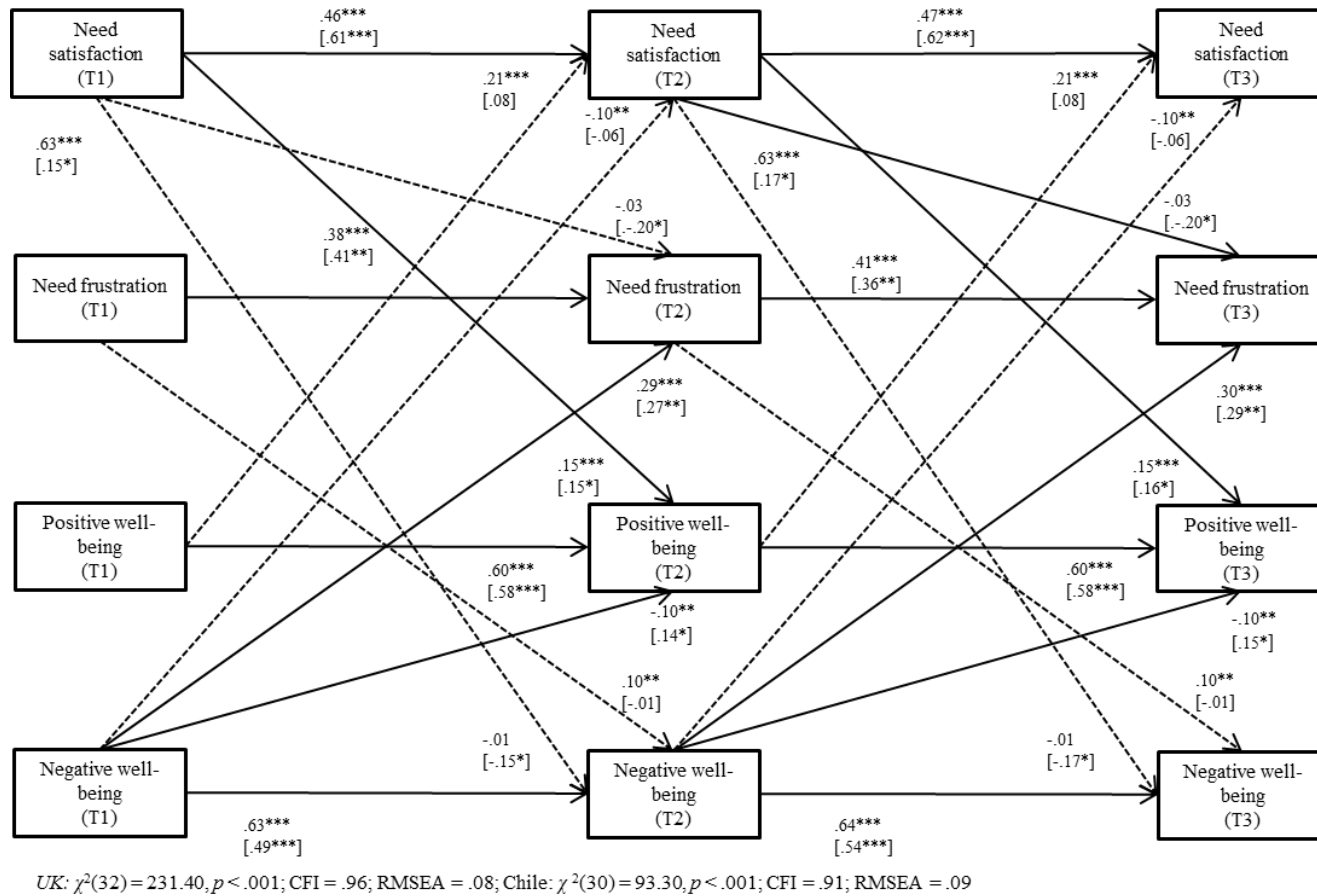


Figure 2. 3: Model 3. Structural model for the associations between the need satisfaction, need frustration, positive well-being and negative well-being in the UK and Chile.

Note: Coefficients shown are standardized path. Chilean coefficients are in brackets. Error terms and covariances are not shown to enhance visual clarity. Solid lines = significant/marginal paths in both countries. Dotted lines = significant/marginal paths only in one country. Paths are only shown when at least one country reach significance or marginal significance. †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

**Phase 3: The bi-directional link between basic psychological need satisfaction and well-being: Integrating hedonic and eudaimonic approaches.**

In our final phase, we explored the hypothesized bi-directional link between basic psychological need satisfaction and subjective well-being<sup>7</sup>. We modelled all constructs as observed indicators<sup>8</sup> using the following procedure. First, a *total basic need satisfaction* measure (need satisfaction and need frustration items) was computed using its observed means scores. Need frustration score was reversed. Second, we created *subjective well-being* and *mental and physical illness* measures following previous studies in the SWB area (Reis et al., 2000; Sheldon & Elliot, 1999; Sheldon & Krieger, 2007; Sheldon & Niemiec, 2006). SWB was built by standardizing the positive affect, the negative affect (reversed) and the life satisfaction scales and then averaging them. Therefore, higher scores imply higher levels of subjective well-being. The *mental and physical illness* measure was created by standardizing and then averaging the depressive symptoms, the vitality (reversed) and the physical symptoms of ill-health scores. Therefore, higher scores in this variable imply lower levels of mental and physical health.

***Model 4: The link between total need satisfaction, subjective well-being and mental and physical illness***

*UK sample.* In Model 4 (Figure 2.4), we aim to integrate hedonic and eudaimonic approaches. First, we set up a three-factor cross-lagged model allowing our variables to covary within each time-point. We also allowed to covary subjective well-being between T1 and T3. The results showed an acceptable model fit,  $\chi^2(17) = 132.08$ ,  $p < .001$ , CFI = .97 and RMSEA = .08.

In the UK, Model 4 shows that basic need satisfaction and subjective well-being has a bi-directional link. Basic need satisfaction was a significant positive prospective predictor of subjective well-being,  $\beta = .13$ ,  $p < .001$ , which in turn was a significant positive prospective predictor of basic need satisfaction,  $\beta = .12$ ,  $p < .01$ . We also found

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<sup>7</sup> We also tested this reverse causality in phases 1 and 2, but more broadly. In phase 3 we create an specific measure for SWB.

<sup>8</sup> Following the same reasoning than in models 2 and 3 (high correlations between our main constructs may lead to suppression effects if we employ latent variables), we decided to model all them as observed variables. The correlations between subjective well-being and mental and physical illness were as follows: Wave 1 (UK:  $r = -.87$ ,  $p < .001$ ; Chile:  $r = -.84$ ,  $p < .001$ ), Wave 2 (UK:  $r = -.88$ ,  $p < .001$ ; Chile:  $r = -.86$ ,  $p < .001$ ) and Wave 3 (UK:  $r = -.89$ ,  $p < .001$ ; Chile:  $r = -.92$ ,  $p < .001$ ).

that need satisfaction was a significant negative prospective predictor of mental and physical illness,  $\beta = -.10$ ,  $p < .01$ , which in turn was a significant negative prospective predictor of need satisfaction,  $\beta = -.21$ ,  $p < .001$ . Finally, mental and physical illness was a significant negative prospective predictor of subjective well-being,  $\beta = -.16$ ,  $p < .001$ , which in turn was a significant negative prospective predictor of mental and physical illness,  $\beta = -.10$ ,  $p < .01$ .

*Chilean sample.* In Chile, we replicated the same procedure than in the UK. We allowed our variables to covary within each time-point, as well as mental and physical health between T1 and T3 and subjective well-being between T1 and T3. The model showed a marginally acceptable model fit,  $\chi^2(17) = 52.65$ ,  $p < .001$ , CFI = .95 and RMSEA = .09.

In Chile, Model 4 (Figure 2.4) showed that basic need satisfaction was a significant positive prospective predictor of subjective well-being,  $\beta = .16$ ,  $p < .001$ , and that subjective well-being was a marginally significant positive prospective predictor of basic need satisfaction,  $\beta = .21$ ,  $p = .09$ . Moreover, mental and physical illness was a marginal negative prospective predictor of subjective well-being,  $\beta = -.18$ ,  $p = .06$  which in turn was a marginal negative prospective predictor of mental and physical illness,  $\beta = -.18$ ,  $p = .08$ .

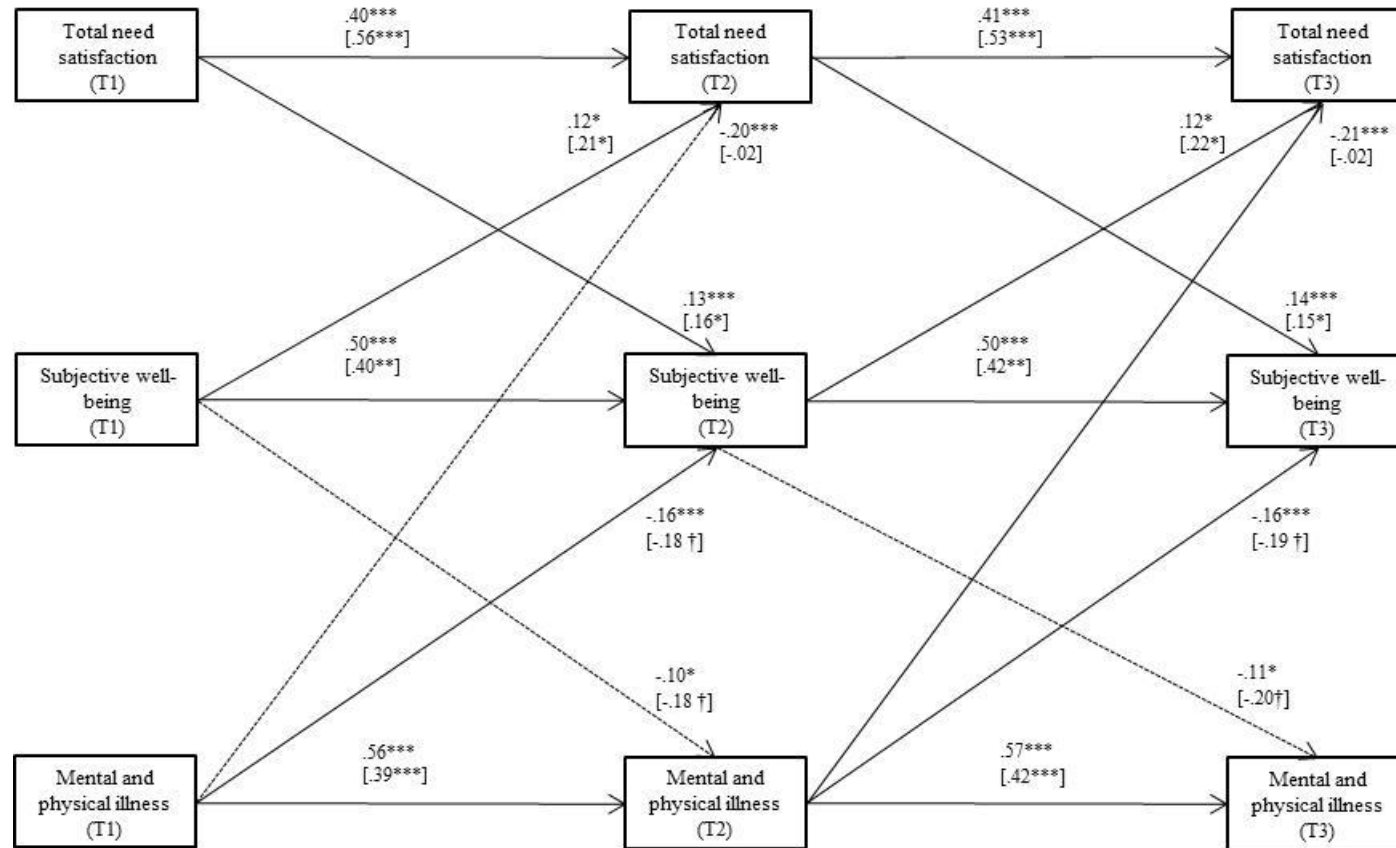


Figure 2. 4: Model 4. Structural model for the associations between total need satisfaction (including the satisfaction and the frustration items), subjective well-being and mental and physical illness in the UK and Chile.

Note: Coefficients shown are standardized paths. Chilean coefficients are in brackets. Error terms and covariances are not shown to enhance visual clarity. Solid lines = significant/marginal paths in both countries. Dotted lines = significant/marginal paths only in one country. Paths are only shown when at least one country reach significance or marginal significance. †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

## Discussion

Research on the link between need satisfaction (three different aspects of eudaimonic well-being) and well-being has some important gaps. An especially important one is that most of the previous studies do not allow causality between the core variables to be implied. In our research, through a more comprehensive longitudinal cross-lagged among adults from two different cultures, the UK and Chile, we extended previous studies on the link between need satisfaction and well-being aiming to integrate hedonic and eudaimonic approaches. We tested our assumptions in a general life setting, over a three-year design, assessing more comprehensive well-being measures than research so far. Moreover, we used for the first time a balanced need satisfaction/need frustration balanced scale (Sheldon & Gunz, 2009) to test longitudinally our core associations. Our main contribution is to show how need satisfaction and well-being and how hedonic and eudaimonic well-being are related across time.

Model 1 showed that higher need satisfaction was a significant positive prospective predictor of well-being in the UK and Chile. Moreover, Model 1 also showed that higher well-being was a significant positive prospective predictor of higher need satisfaction in the UK.

When we split total need satisfaction into the three basic psychological needs, Model 2 showed that in the UK, only the need for relatedness prospectively predicted higher levels of well-being. Our results highlighted the key importance of feeling connected, appreciated and understood by others who are important to us through intimate, meaningful and deep relationships, supporting previous studies showing that relatedness is often at or very near the top of the factors influencing well-being (Ryan and Deci, 2001). In Chile, none of the three needs reached statistical significance.

Model 2 also showed that in the UK, well-being was a significant positive prospective predictor of the three needs, supporting the hypothesized reversed link from well-being to need satisfaction. In Chile, well-being was a significant positive prospective predictor of the need for autonomy and a marginal positive predictor of the need for relatedness.

When we split total need satisfaction into its sub-scales (need satisfaction and need frustration) and well-being into positive and negative well-being, our results supported theoretical predictions arguing that people's tendencies towards both well-

being and ill-being may be explained not only by basic psychological need satisfaction, but also by need frustration (Vansteenkiste & Ryan, 2013). For example, Model 3 showed that basic need satisfaction was a significant positive prospective predictor of positive well-being in the UK and Chile. In addition, Model 3 also found that need frustration was a significant positive prospective predictor of negative well-being in the UK. These results show that higher basic need satisfaction significantly predicts higher positive well-being, but, as expected, need frustration does not. Moreover, need frustration significantly predicts higher levels of negative well-being, but need satisfaction is unrelated with it. Therefore, these results supported previous claims arguing that the lack of need fulfilment does not necessarily entail the experience of need frustration, as each of them has a distinctive effect on people's positive and negative well-being (Vansteenkiste & Ryan, 2013).

Finally, our paper also allows us to integrate hedonic and eudaimonic research. We specifically tested the bi-directional link between need satisfaction (as a measure of psychological/eudaimonic well-being) and hedonic well-being (as indexed as subjective well-being). Our results from Model 4 showed that despite the fact that both constructs tap in different factors (Keyes et al., 2002; Ryff, 1989), they are closely related through a bi-directional link in the UK and Chile. In fact, basic need satisfaction was a positive prospective predictor of subjective well-being and vice versa (although in Chile the reverse link reached marginal significance). Therefore, extending previous correlational findings exploring the associations between both constructs, we showed that in both countries SWB and need satisfaction complement each other reciprocally, thereby providing a sense of self-congruency, as stated by psychological well-being research (Keyes et al., 2002). Our key results thus show how both eudaimonic and hedonic constructs are related over time.

We should acknowledge some limitations of the current research. First, all measures were self-reported, and objective evaluations of well/ill-being would be desirable. Second, given that our participants were all university graduates, we should be cautious about generalizing these findings to poorer and less educated groups. Third, our research may reflect only two countries characterizations (the UK and Chile) and, possibly, middle- and upper class socio-economic status. That is a key reason to understand why different samples and cultures need to be explored in further research. Fourth, we only employed three scales for measuring PBW, those studied from the SDT perspective. Future research should explore the link between hedonic and eudaimonic

approaches using a wider variety of PWB indicators (Ryff, 1989). Fifth, despite the strong causal evidence for the link between need satisfaction and well-being, our longitudinal design does not rule out the possibility of a third, unmeasured variable that influences both constructs. Nonetheless, our cross-lagged results significantly strengthen the case for a causal link between the core variables, because they established temporal precedence.

In summary, our results support the view that total basic psychological need satisfaction provides the experiential nutrients for people's well-being (Sheldon & Krieger, 2007). However, it seems that at least in this research, only the need for relatedness is driving this effect. Importantly, need satisfaction may start a reverse process where well-being may also foster satisfaction of the psychological needs (different aspects of eudaimonic well-being), leading to a virtuous circle of growth and flourishing. However, when the needs are not fulfilled (or are frustrated), the process may lead to a vicious circle of *vulnerabilities* and defensiveness (Vansteenkiste & Ryan, 2013). All in all, our key results point to an integration of hedonic and eudaimonic approaches.

**PAPER 3: Life Goals Predict Environmental Behaviour: Cross-sectional and Longitudinal Evidence from the UK and Chile**

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Reference:

Unanue, W., Vignoles, V., & Dittmar, H. (2013). Life goals predict environmental behaviour: Cross-sectional and longitudinal evidence from the UK and Chile. *Unpublished manuscript*.



### **Abstract**

We explored the link between intrinsic (versus extrinsic) life goals and environmentally responsible behaviour using correlational (Study 1) and longitudinal (Study 2) data from adult participants in a mass consumer society (UK) and a fast developing nation (Chile). Study 1 showed that, in both countries, a higher relative importance attached to intrinsic life goals was associated with higher levels of environmentally responsible behaviour, over and above environmental worldviews and environmental identification. Study 2 showed that life goals prospectively predicted environmentally responsible behaviour over a three-year period, whereas environmental worldviews and environmental identification did not. These results support arguments that focusing on intrinsic life goals (self-development, community involvement, relationships) rather than extrinsic life goals (money, fame, image) may be important not only for personal well-being, but also for the well-being of future generations.

### **Introduction**

A substantial body of research has shown a link between people's life goals or aspirations and their personal well-being. People pursuing more intrinsic rather than extrinsic (or materialistic) life goals tend to show higher life satisfaction (e.g., Burroughs & Rindfleisch, 2002; Kasser, 2002; Vansteenkiste, Soenens, & Duriez, 2008), self-actualization (e.g., Kasser & Ryan, 1993, 1996), positive affect (e.g., Christopher, & Schlenker, 2004), vitality (e.g., Kasser & Ahuvia, 2002), and happiness (e.g., Burroughs & Rindfleisch, 2002), as well as lower negative affect (e.g., Christopher, Kuo, Abraham, Noel, & Linz, 2004), alcohol and substance use (e.g., Williams, Cox, Hedberg, & Deci, 2000), physical problems (e.g., Kasser & Ryan, 1996), and depressive symptoms (Vansteenkiste, Lens, & Deci, 2006). These associations have been confirmed in a recent meta-analysis (Dittmar, Bond, Kasser, & Hurst, in press).

A few studies have suggested that life goals might also have implications for the natural environment. For example, people who attach a higher importance to extrinsic values and life goals may tend to engage in more damaging environmental behaviour (Banerjee & McKeage, 2004; Brown & Kasser, 2005; Richins & Dawson, 1992; Sheldon & McGregor, 2000). However, the existing evidence has been limited to a small number of cross-sectional studies, conducted mostly among students and other young people in a few Western nations, and it remains unclear to what extent intrinsic (versus extrinsic) life goals are causally implicated in environmentally responsible

behaviour, over and above the effects of other likely predictors such as a pro-environmental worldview and a sense of identification with the natural environment. Here, we explored whether intrinsic (versus extrinsic) life goals would predict environmentally responsible behaviour, over and above any effects of environmental worldviews and environmental identification, among adults in the UK and Chile, using both cross-sectional and longitudinal data, in order to provide evidence for the causal direction of the relationships observed.

### **Life Goals and their Link to Environmentally Responsible Behaviour**

Climate change and global warming are the biggest human challenges of the 21st Century (United Nations Development Programme, 2007). The future of the environment is in serious danger, mainly due to human consumption activity (Brown & Kasser, 2005; Commission for Environmental Cooperation, 2002; Crompton & Kasser, 2009). In this process, peoples' life goals and aspirations are thought to have played a key negative role that needs to be deeply understood in order to protect the well-being of future generations (Crompton & Kasser, 2009; Tanner, 1999).

In recent years, several correlational studies have explored the link between extrinsic life goals (or materialistic values) and environmentally damaging behaviour. Richins and Dawson (1992) found, in a sample of US households, that more materialistic people were less likely to buy used goods or to use bicycles instead of cars, but also had a lower ecological awareness, such as recycling and contributing to ecological organizations. In a study of UK households, Gatersleben, White, Abrahamse, Jackson, and Uzzell (2009) found that the people scoring higher in materialism attached greater importance to possessions associated with high energy use, such as TVs, mobile phones and cars, attached less importance to energy-conserving processes, and showed less willingness to change a range of ecologically irresponsible behaviour. In samples of US adolescents and adults, Brown and Kasser (2005) found that ecologically responsible behaviour was positively associated with an intrinsic (versus extrinsic) value orientation. Studying common social dilemmas among young students in the US, Sheldon & McGregor (2000) explored the association between life goals and harvesting strategies, finding that more extrinsically oriented students would consume limited ecological resources at more unsustainable rates. In a sample of American students, Banerjee & McKeage (1994) found that environmentally-friendly consumption was negatively related to materialism. Furthermore, in a recent nation-level analysis across

20 wealthy nations, Kasser (2011) found that countries placing a higher priority on the value of *harmony* (intrinsic) versus the value of *mastery* (extrinsic), tended to have lower CO2 emissions, after controlling for effects of national wealth.

Although these studies provide supportive evidence for a link between life goals or values and environmental behaviour, they are all based on one-shot correlational designs, making it impossible to untangle the causal direction between these two variables. Do intrinsic (versus extrinsic) life-goals lead to more ecologically responsible behaviour, or does ecologically responsible behaviour lead to more intrinsic life-goals. We are aware of just one study to date that has used an experimental design to address this question: Sheldon, Nichols, & Kasser, (2011) found that American students recommended smaller ecological footprints when they were prompted to think of intrinsic values as characteristically American. However, their dependent measure involved participants' responses to a highly imaginary scenario, and the authors did not measure whether their manipulation affected participants' everyday behaviour. Hence, we believe there is an urgent need for systematic longitudinal research to help disentangle the causal relationship between people's life goals and their everyday behaviour.

In summary, previous studies have associated a higher focus on extrinsic (versus intrinsic) life goals with several anti-ecological behaviour that negatively affect the well-being of the Earth, suggesting that an intrinsic value orientation would be more beneficial for the sustainability of the planet. However, as confirmed by a recent meta-analysis (Hurst, Dittmar, Bond, & Kasser, 2013), there are still three important research gaps in the field that we aim to address:

First, to date, there are no longitudinal studies exploring the relationship between life goals and everyday environmental behaviour. Therefore, longitudinal evidence is necessary to disentangle the correct direction of the link.

Second, although research has suggested that environmental behaviour may be affected by life goals, environmental worldviews and environmental identification, these variables have never been studied together (Gatersleben, Murtagh, & Abrahamse, 2012). Therefore, we know little about their combined impact on environmental behaviour, nor how these variable are related to each other. Crucially, it seems important to know whether life goals add variance to predictions of environmentally responsible behaviour, over and above the possible effects of these other predictors.

Third, most of the research so far has been conducted among students and other young people in the western world. To date, there is still very little research among adult samples. However, there is empirical evidence showing that environmental behaviour might differ significantly between adults and younger generations (Grouzet et al., 2005; Hurst et al., in press; Sparks et al., 2014).

Notably, adults may have more freedom and economic resources to make decisions that may affect the environment, whereas students may have more of these decisions made for them. That is mainly because students normally do not have a regular salary. They depend on their parents' decisions. Moreover, according to our knowledge, all published research studying the link between intrinsic (versus extrinsic) life goals and self-report of actual environmental behaviour has conducted in western nations, which is a very small part of the world population (United Nations Development Programme, 2010). The case of Chile, a South American country, is especially interesting to study. Its fast economic growth has led to higher GDP per capita (United Nations Development Programme, 2010) which in turn may provide new opportunities for a larger number of people in the country to follow the dangerous messages of global consumer culture and thus to make choices that damage the natural environment (Brown & Kasser, 2005).

These arguments show the need for a detailed exploration of the associations between environmental behaviour, life goals, environmental worldviews and environmental identification in a more comprehensive model, employing adult samples across different cultures, and using a longitudinal design to help disentangle the causal links between the constructs.

### **Alternative Predictors of Environmentally Responsible Behaviour**

Research has consistently shown that a pro-environmental worldview is associated with more environmentally responsible behaviour (Gatersleben, Murtagh, et al., 2012; Gatersleben, White, Abrahamse, Jackson, & Uzzell, 2010; Steg & Vlek, 2009). These findings have been confirmed through meta-analysis (Hines, Hungerford, & Tomera, 1987; Bamberg & Möser, 2007) and longitudinal research (Kaiser, Wölfling, & Fuhrer, 1999).

Because we live in times of disengagement from the natural environment, and people's sense of disconnection with it may lead to detrimental consequences for our planet (Sparks et al., 2014), research has shown an increasing interest in the study of

environmental identification and its link to environmental behaviour (Mayer & Frantz, 2004; Schultz, 2001). Basically, the concept of environmental identification (an example of an extended self) reflects a person's sense of connection to nature, and therefore, it may affect the ways in which people perceive the natural world (Crompton & Kasser, 2009).

Some scholars have stated that environmental identification may motivate environmentally responsible behaviour: If people see themselves as environmentally friendly, they may tend to show higher levels of pro-environmental behaviour in terms of, for example, waste, transport and buying behaviours (Gatersleben, Murtagh, et al., 2012). Some research has supported these claims. For example, Whitmarsh & O'Neill (2010) found that environmental identification was positively associated with several pro-environmental behaviours, and Nigbur, Lyons, & Uzzell (2010) reported that pro-environmental self-identity related positively not only to pro-environmental intentions, but also to self-reports of pro-environment behaviour.

Therefore, it seems likely that intrinsic (versus extrinsic) life goals, environmental worldviews and environmental identification will each be significantly associated with pro-environmental behaviour. However, we sought to show additionally, using a longitudinal research design that would be sensitive to temporal sequencing, the extent to which each of these variables would be a unique prospective predictor (i.e. an antecedent) of environmentally responsible behaviour, while controlling for effects of the other two variables.

### **Contexts for the Present Research: the UK and Chile**

Extrinsic and materialistic life goals have been present in developed countries and long-established mass consumer societies – e.g. UK and US – for many years (Twenge & Kasser 2013). Moreover, some research has explored these constructs in developing countries such Russia (Ryan, Chirkov, Little, Sheldon, Timoshina, & Deci, 1999), India (Dittmar & Kapur, 2011) and Chile (Unanue, Dittmar, Vignoles, & Vansteenkiste, 2013). In the current study, we collected data from adult participants in the UK and Chile.

Chile and the UK differ in several respects such as geography, economic wealth and consumer culture penetration (United Nations Development Programme, 2010), and thus it seems important to test our hypotheses among participants in these two very different national contexts. Indeed, Gatersleben, Jackson, Meadows, Soto, & Yan (2012)

have found that the link between materialistic values and environmental outcomes did not appear to be universal and might be culturally specific: they found that materialism was a significant predictor of environmental worldviews and ecologically responsible behaviour intentions in the UK and in Spain, but not in China. Such findings raise the question as to what extent intrinsic (versus extrinsic) life goals may yield similar or different results in the UK and Chile, especially since no previous research has explored these relationships in a South American context. No previously published research has examined the relationship between life goals and the environment in non-Western countries using a broad measure of extrinsic (versus intrinsic) aspirations such as the employed by Kasser and Ryan (1996). The only study to date (Gatersleben, Jackson et al., 2012) that has explored these issues outside the Western world, used a much narrower measure of materialistic values (Richins & Dawson, 1992). Moreover, they measured environmental behaviour intentions instead of asking participants to report on their actual behaviour. Therefore, analysing the link between life goals and self-reports of actual behaviour in the UK, a mass established consumer society, and Chile, a South American country in fast economic transition, is of much interest. As mentioned before, Chilean's fast economic growth (United Nations Development Programme, 2010) may provide new opportunities for a larger number of people in the country to do more damage to the environment, making this an especially important context in which to study these processes.

### **The Present Research**

Despite some research showing significant associations between intrinsic (versus extrinsic) life goals and environmentally responsible behaviour, there is still relatively little evidence to support the idea, and there are important research gaps – mentioned above – that need to be addressed. In the current research, among samples of UK and Chilean adults, we sought to extend previous findings into the link between intrinsic (versus extrinsic) life goals and environmentally responsible behaviour in the following three ways.

First (Study 2), we employed a longitudinal design to disentangle the correct temporal sequence in the link between intrinsic (relative to extrinsic) life goals and environmentally responsible behaviour.

Second (Study 1 and Study 2), because it has been shown that environmental behaviour is associated with pro-environmental worldviews and environmental

identification, as well as with intrinsic (versus extrinsic) life-goals, we studied for the first time all these key variables together, in order to increase our understanding of their relative impact on environmental behaviour.

Third (Study 1 and Study 2), we tested whether the paths in our model are moderated by national context, comparing the UK – an established mass consumer society – with Chile – a fast-growing new economy employing adult samples.

In summary, we tested the following hypotheses in our UK and Chilean samples (see Figure 1):

(H1) A stronger importance attached to extrinsic (relative to intrinsic) life goals will predict lower environmentally responsible behaviour both contemporaneously (Study 1) and prospectively (Study 2).

(H2) Stronger environmental worldviews will predict higher environmentally responsible behaviour both contemporaneously (Study 1) and prospectively (Study 2).

(H3) A stronger environmental identification will predict higher environmentally responsible behaviour both contemporaneously (Study 1) and prospectively (Study 2).

## Study 1

### Method

**Participants and procedure.** British and Chilean graduates took part in a research project on materialism, personal well-being and environmental worldviews, attitudes and behaviour where the core measures for the present paper were collected (see also Unanue et al., 2013). The British sample consisted of 958 adults living in the UK, ranging in age from 20 to 77 years (Mean = 44.68; *SD* = 13.98). Respondents (59% female) were former graduates, recruited through the alumni office of a university in the South East of England. The Chilean sample consisted of 257 adults living in Chile, ranging in age from 19 to 71 years (Mean = 34.81; *SD* = 10.54). Respondents (53% female) were also all former graduates, recruited mostly through the alumni office of a university in Santiago, but also through personal contacts of the first author. Participants were sent an introductory email containing a brief description of the study along with a

web link to the survey. The UK participants were offered entry into a prize draw for university memorabilia. In Chile, the same instructions were sent but participants were not offered entry into a prize draw. All participants provided written consent and were informed that they could withdraw from the study at any point. The purpose of the research was described in broad terms (hence, no deception was involved), and respondents were given the opportunity to receive a summary of the research findings. The first page of the survey contained a brief description of the study, and the second page informed participants of their right to withdraw at any time, as well as assuring their anonymity and confidentiality with regards to their responses. Then, participants were asked to complete the core measures for the present research: materialism, pro-environmental worldviews, environmentally responsible behaviour and environmental identification. Some other measures were collected but they are not relevant for the present research (see Unanue et al., 2013). The final section of the survey assessed demographic details, including (among others), age and gender. This project used various scales, the majority of which are known to have good psychometric properties. The questionnaire was translated into Spanish for the Chilean participants, and equivalence of meaning with the English version was checked through established back-translation procedures (Brislin, 1970).

**Measures.** We modelled all constructs as latent variables using three indicators per factor. Following the recommendations of Little, Cunningham, Shahar, & Widaman (2002), we created item parcels for each measure except for environmental identification, as described below.

***Intrinsic (versus extrinsic) life goals.*** This variable was modelled as a latent variable, using a shortened, 30-item version of the *Aspiration Index* (AI; Kasser & Ryan, 1993, 1996) to assess the importance of different life goals. We used six categories of aspirations with five specific items within each category. Aspirations are either extrinsic (money, image, fame) or intrinsic (self-development, community involvement and affiliation). We asked people to rate how important each goal is to them personally. Example items are *To be a very wealthy person* (money), *To have my name known by many people* (fame), *To successfully hide the signs of aging* (image), *To grow and learn new things* (self-development), *To have good friends that I can count on* (affiliation), and *To work for the betterment of society* (community involvement). To obtain the relative importance placed on extrinsic aspirations compared to intrinsic ones, we followed Duriez, Vansteenkiste, Soenens, and De Witte (2007). First, an individual's



overall mean score was subtracted from each individual item. Second, the intrinsic items were reversed and an overall extrinsic versus intrinsic (E/I) value score was computed by averaging the extrinsic and the (reversed) intrinsic scales. Cronbach's alpha was good in the UK ( $\alpha = .73$ , Mean = -1.51, SD = .42) and in Chile ( $\alpha = .82$ , Mean = -1.40, SD = .36). Positive (negative) scores reflect a tendency to prefer extrinsic (intrinsic) rather than intrinsic (extrinsic) values. Third, and finally, we created three parcels, each employing one extrinsic and one (reversed) intrinsic scale to be used as indicators.

***Pro-environmental worldviews.*** We used the *New Ecological Paradigm* scale (NEP; Dunlap et al., 2000), a 15-item Likert-type scale designed to measure environmental worldview<sup>9</sup>, concerns and beliefs towards the environment. Examples items are “*We are approaching the limit of the number of people the earth can support*” and “*Humans have the right to modify the natural environment to suit their needs*” (reversed). Participants rated these statements from 1 (strongly disagree) to 5 (strongly agree). The internal reliability of the scale was good, both in the UK ( $\alpha = .80$ ) and in Chile ( $\alpha = .70$ ). We combined the items into three different parcels.

***Environmental identification.*** We used the *Environmental Identity* scale (Hinds & Sparks, 2008), a 3-item Likert-type measure designed to evaluate an individual's identification with the natural environment. An example item is “*For me, engaging with the natural environment gives me a greater sense of who I am*”. Participants rated each item from 1 (strongly disagree) to 5 (strongly agree). The internal reliability of the scale was good, both in the UK ( $\alpha = .87$ ) and in Chile ( $\alpha = .83$ ). We modeled environmental identification using its 3 single items.

***Environmentally responsible behaviour.*** We created an *Environmentally Responsible Behaviour* index using the General Ecological Behaviour questionnaire (GEB; Kaiser & Wilson, 2004), a scale designed to measure different kinds of friendly and unfriendly ecological behaviour. Examples are “*I drive my car in or into the city, even when there are other forms of transport*” or “*I boycott companies with an unecological background*”. For our index, the original scale was adapted following the recommendations of Kaiser et al. (1999). First, the authors recommended that environmental behaviour should be measured more generally rather than specifically.

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<sup>9</sup> Researchers in the field have often labeled this scale as “pro-environmental attitudes”. However, following the original scale authors, we believe that the items of this scale are better interpreted as measuring environmental worldviews than attitudes.

Second, they suggested that any environmental behaviour measurement approach should select which behaviour to measure according to their difficulty. Following this advice, we created an environmental behaviour measure focusing on behaviour of an average difficulty level. A group of graduate students and faculty from the School of Psychology at a university in the South East of England ranked from 1 (never) to 5 (always) how often they are were used to performing 50 environmental behaviour. We asked them “*For the following 32 behaviour, please indicate how often you perform them*” or “*For the following 18 behaviour, please indicate whether you perform them or not*”. Then, we excluded those behaviour that were regularly and easily followed (more that 65% of responses), but also those behaviour that were most difficult to follow (less than 35% of responses). Thus, in order to focus on behaviour with average difficulty we chose the 10 behaviour (e.g., energy conservation, mobility and transportation, waste avoidance, consumerism, recycling, social behaviour toward conservation) that were followed with average difficulty (around 50% of responses). We modelled ecologically responsible behaviour by combining these behaviour into three different parcels.

***Environmental knowledge.*** We also developed an environmental knowledge measure using the Environmental Knowledge Scale originally developed by Frick, Kaiser, and Wilson (2004) and following the suggestions of Kaiser et al. (1999). Example items are “*Global warming also has an effect on the Gulf Stream that will affect Europe. What is this effect?*” Or “*To travel 1 km (1 mile), how much more energy is consumed per person by car as compared to by train?*”. In building this measure, we followed the same procedure as we used for our pro-environmental behaviour measure described above.

## Results

We employed structural equation modelling (SEM, AMOS 18.0) to assess the hypothesized associations between intrinsic (versus extrinsic) life goals, environmental worldviews, environmental identification and environmentally responsible behaviour, both in the UK and Chile. Descriptive statistics and inter-correlations for all the study variables are shown in Table 3.1. In all analyses (Study 1 and Study 2), we assessed model fit based on the recommendations of Hu and Bentler (1999) and Kline (2005). According to these authors, RMSEA values  $\leq .06$  indicate close approximate fit and

values between .06 and .08 suggest reasonable error of approximation. CFI values greater than .90 indicate acceptable good fit.

Table 3. 1: Descriptives and Inter-Correlations Between All Study Variables in the UK and Chile (Study 1)

	M	SD	2	3	4	5	6
<i>UK participants</i>							
1. Extrinsic (versus intrinsic) life goals (E/I)	-1.48	0.60	-.22**	-.36**	-.28**	-.16**	-.12**
2. Environmental worldviews	3.74	0.55		.39**	.40**	.13**	.07*
3. Environmentally responsible behaviour	3.54	0.56			.38**	.19**	.02
4. Environmental identification	3.79	0.92				.18**	.12**
5. Gender (female percentage)							-.13**
6. Age	44.70	13.98					
<i>Chilean participants</i>							
1. Extrinsic (versus intrinsic) life goals (E/I)	-1.34	0.67	-.10	-.24	-.02	-.19**	-.11
2. Environmental worldviews	3.80	0.47		.29**	.43**	.16**	.04
3. Environmentally responsible behaviour	3.02	0.63			.36**	.17**	.03
4. Environmental identification	4.03	0.88				.11	.11
5. Gender (female percentage)							-.09
6. Age	34.81	10.54					

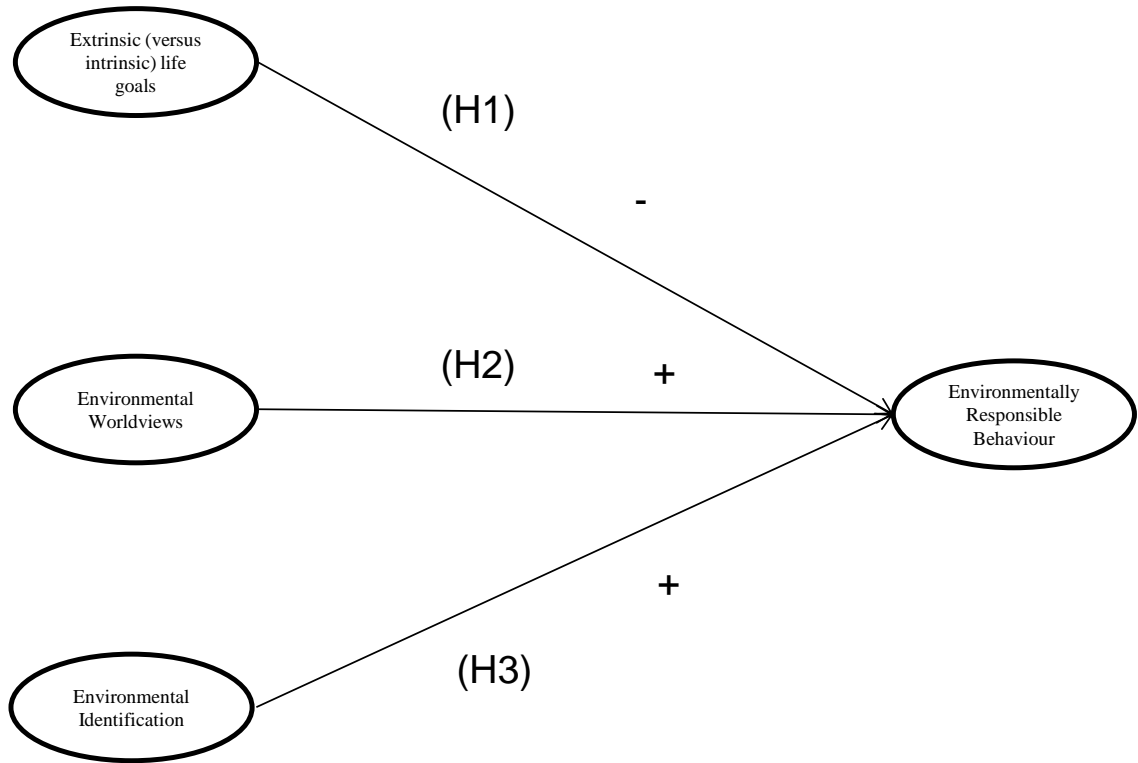
† p < .10, \* p < .05, \*\* p < .01, \*\*\* p < .001

**Measurement models.** First we tested a four-factor multigroup measurement model for both countries in which no constraints were imposed. We allowed all variables to covary. The results demonstrated a good model fit,  $\chi^2(96) = 238.041$ ,  $p < .001$ , CFI = .97, RMSEA = .04.

To test for metric invariance, we constrained all the factor loadings in our measurement model to be equal across the two groups, and then we compared this model to the baseline model where no constraints were imposed. The model fit remained acceptable:  $\chi^2(104) = 287.54$ ,  $p < .001$ , CFI = .96, RMSEA = .04. According to Cheung and Rensvold (2002), the assumption of invariance is tenable if the reduction in CFI when constraints are imposed is less than .01. Here, the reduction in CFI met this criterion ( $\Delta\text{CFI} = -.008$ ). Therefore, we considered it acceptable to assume that the pattern of factor loadings was invariant across the countries, and so we maintained these constraints in the structural models reported below.

**Structural models.** We now created a structural model to test our different hypotheses (see Figure 3.1). In initial analyses, we controlled for environmental knowledge, age and gender in both samples, allowing all these variables to covary and to predict environmentally responsible behaviour. However, including these control

variables did not affect our main results. Therefore, for simplicity, we have excluded them from the analyses reported here.



*Figure 3. 1:* Structural model for the hypotheses about the links between extrinsic (versus intrinsic) life goals, environmental worldviews, environmental identification and environmentally responsible behaviour in the UK and Chile.

To test our hypotheses, we set up a multigroup model in which extrinsic (versus intrinsic) life goals, pro-environmental worldviews and environmental identification were allowed to predict environmentally responsible behaviour. We allowed the three predictor variables to covary. Initially, we allowed all the structural paths to freely vary across the two national samples. This structural model was statistically equivalent to the measurement model, and so fit indices were identical. Results are shown in Figure 3.2.

Extrinsic (versus intrinsic) life goals was a significant and negative predictor of environmentally responsible behaviour in the UK,  $\beta = -.33, p < .001$  and in Chile,  $\beta = -.28, p < .001$ , giving empirical support to our first hypothesis.

Pro-environmental worldview was a significant and positive predictor of environmentally responsible behaviour in the UK,  $\beta = .31, p < .001$  and marginal in Chile,  $\beta = .19, p < .10$ , giving empirical support to our second hypothesis.

Environmental identification was a significant and positive predictor of environmentally responsible behaviour in the UK,  $\beta = .22, p < .001$ , and in Chile,  $\beta = .35, p < .01$ , giving empirical support to our third hypothesis.

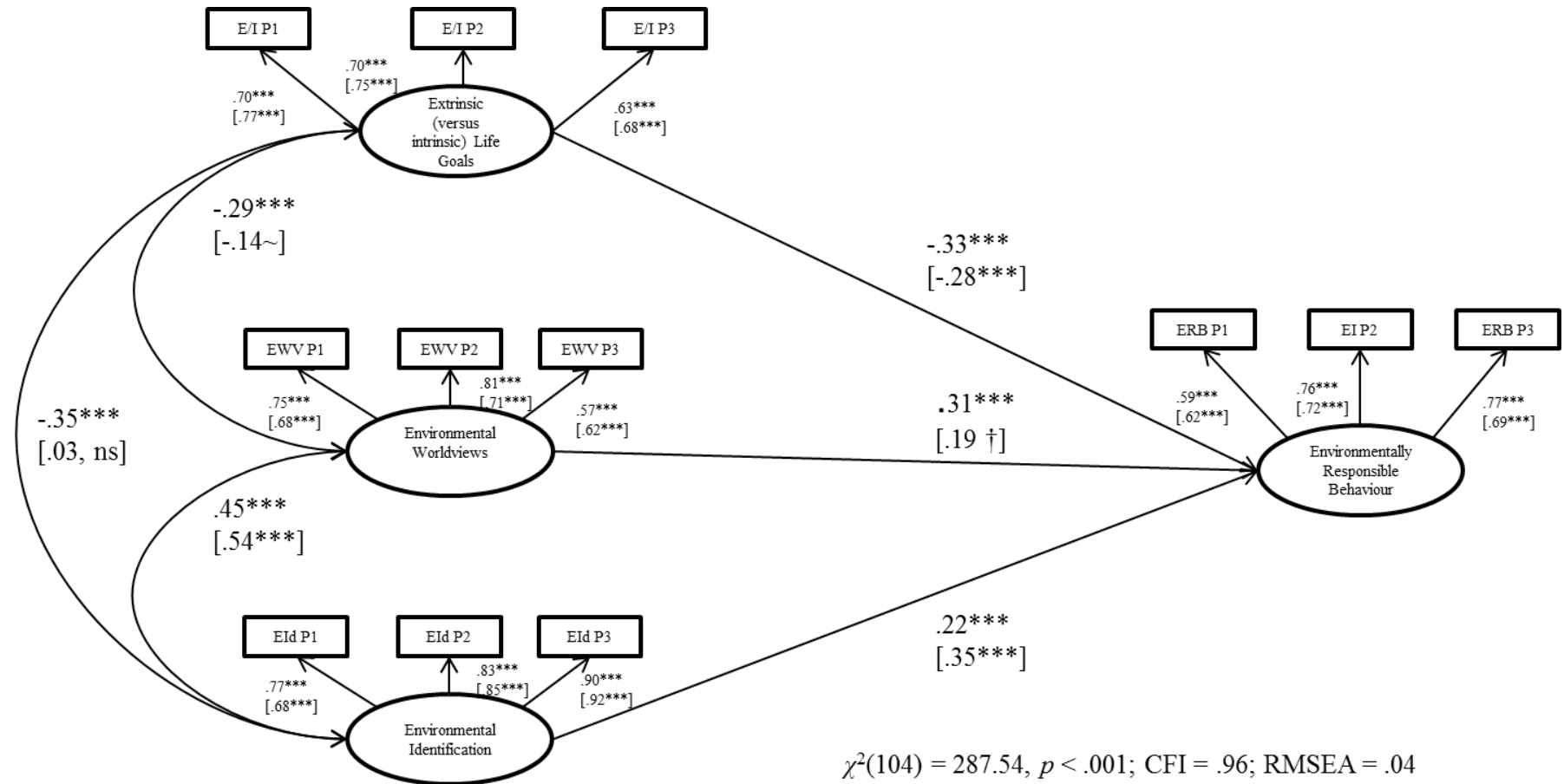


Figure 3.2: Structural multigroup model for the associations between extrinsic (versus intrinsic) life goals, environmental worldviews, environmental identification and environmentally responsible behaviour in the UK and Chile.

Note: Coefficients shown are standardized paths. Chilean coefficients are in brackets. Error terms are not shown to enhance visual clarity. E/I = Extrinsic (versus intrinsic) life goals; EWV = Pro-Environmental worldviews; EId= environmental identification; ERB = environmentally responsible behaviour; Pi = parcel (i); †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

Additionally, extrinsic (versus intrinsic) life goals were negatively correlated with pro-environmental worldviews, significantly in the UK ( $\beta = -.29, p < .001$ ) and marginally in Chile ( $\beta = -.14, p < .10$ ). Extrinsic (versus intrinsic) life goals were negatively correlated with environmental identification in the UK:  $\beta = -.35, p < .001$ , but not in Chile:  $\beta = -.03, p = .72$ . Pro-environmental worldviews were positively correlated with environmental identification in the UK:  $\beta = .45, p < .001$  and in Chile:  $\beta = .54, p < .001$ .

Finally, we tested a model where we constrained the corresponding paths from our three predictors to environmentally responsible behaviour to be equal across cultures. This model continued to show acceptable fit:  $\chi^2(107) = 290.82, p < .001$ , CFI = .96, RMSEA = .04. Moreover, the constrained model did not show a significant loss of fit compared to the unconstrained model,  $\Delta\chi^2(3) = 3.28, p = .35$ . Therefore, it may be concluded that culture did not significantly moderate the structural relationships between our core variables.

## Discussion

Results from Study 1 supported our expectation that more extrinsically-oriented people would tend to show lower levels of environmentally responsible behaviour in both countries. Importantly, we showed that life goals significantly predicted environmentally responsible behaviour while controlling for the effects of environmental worldviews and environmental identification. Our results support the claim that a higher focus on external (materialistic) rewards is detrimental for limited natural resources. Being focused on extrinsic life goals would conflict with being interested in other people's welfare and with the future of nature, which in turn may lead to lower environmentally responsible behaviour.

Our data also supported our hypothesis in the UK and marginally in Chile about the positive link between both pro-environmental worldviews and environmentally responsible behaviour, replicating previous findings (Bamberg & Möser, 2007; Hines et al., 1987; Steg & Vlek, 2009). Furthermore, in both countries there was a positive link between environmental identification and pro-environmental behaviour (Gatersleben, Jackson, et al., 2012; Gatersleben, Murtagh, et al. 2012; Nigbur et al., 2010; Whitmarsh & O'Neill, 2010).

In summary, Study 1 showed that a relative higher importance attached to extrinsic life goals correlates negatively with environmentally responsible behaviour

above and beyond the effects of pro-environmental worldviews and environmental identification, suggesting that the materialistic messages of our consumer cultures may have wide-ranging negative consequences for the planet. Our key results were found not only in the UK, with a long-established mass consumer culture, but also in Chile, a developing nation which has never been studied using this framework, suggesting that the negative consequences of attaching a higher importance to material and external rewards may be found across nations.

Despite the important results provided by Study 1, a key limitation is its cross-sectional design, which does not allow us to infer causal direction. Hence, we sought to rectify this in Study 2, using a longitudinal design with three waves of data collection over two years.

## Study 2

### Method

**Participants and procedure.** In 2010 (Study 1, T1), participants were told that the project was part of a longitudinal study and were asked for their consent for future surveys (T2 and T3). Subsequent e-mails were sent to those who had agreed to continue participating. Therefore, data were obtained for a three-wave longitudinal survey (T1 = 2010, T2 = 2011 and T3 = 2012). We employed the same procedure as in Study 1 to collect the data for the three waves. Among the British sample, 461 adults (48.12% of time 1; 59% female) ranging in age from 20 to 77 years (Mean = 45.14; *SD* = 14.06) completed all three waves. 594 UK participants completed T2 and 610 completed T3. Among the Chilean sample, 76 adults (29.6% of time 1; 47% female) ranging in age from 22 to 71 years (Mean = 36.87; *SD* = 10.21) took part in all three waves. 115 Chilean participants completed T2 and 114 completed T3.

**Measures.** We collected the same variables that we used in Study 1 and we modelled all constructs as they were modelled in Study 1. Cronbach's alphas in the three waves were good for all our measures. Extrinsic (versus intrinsic) life goals ranged from .71 to .74 in the UK and from .81 to .82 in Chile. Pro-environmental worldviews ranged from .79 to .80 in the UK and from .67 to .72 in Chile. Environmental identification ranged from .84 to .87 in the UK and from .80 to .83 in Chile.



## Results

All the constructs of interest were measured at T1, T2 and T3. Descriptive statistics and inter-correlations for all the study variables are shown in Table 3.2. We employed structural equation modeling (SEM, AMOS 18.0) to assess our main hypotheses. We employed an autoregressive cross-lagged model (Finkel, 1995) for testing our causal hypotheses. Each construct was regressed on both its own lagged score as well as the other constructs' lagged scores. As in Study 1, we modelled the constructs as latent variables with three indicators for each construct, in order to account for measurement error (Finkel, 1995; Schlueter et al., 2008).

**Measurement models.** First we set up a four-factor multigroup measurement model for both countries in which no constraints were imposed. As suggested by Jöreskog (1979) and Schlueter et al. (2008), we incorporated auto-correlated error terms for the observed indicators. We allowed all our variables to covary. The results demonstrated a good model fit,  $\chi^2(1040) = 1642.31$ ,  $p < .001$ , CFI = .97, RMSEA = .02. In order to test for metric invariance, we constrained all the factor loadings to be equal across the waves and across the groups, and then we compared this model to the baseline model where no constraints were imposed. The model fit remained good:  $\chi^2(1056) = 1680.04$ ,  $p < .001$ , CFI = .97, RMSEA = .02. Following Cheung and Rensvold (2002), as the reduction in CFI was less than .01, it was safe to assume that the pattern of factor loadings was invariant over time and across countries. Hence, we maintained these constraints in all further structural models reported below.

**Cross-lagged models.** We now set up our main structural model to test our hypotheses. We started with a structural cross-lagged reciprocal model for our core variables (see Figure 3.3). By doing so, we allow all the constructs to be represented as causal antecedents and/or consequences of all other constructs. To gain statistical power for our hypothesis tests, and because we did not expect differences in the path trajectories across waves, we constrained all the corresponding lagged paths to be equal between T1 and T2 and between T2 and T3 within each country. Hence, each of our hypotheses H1 to H3 is represented by a single parameter test representing the combined effect from H1 to H2 and from H2 to H3. The model fit remained good:  $\chi^2(1088) = 1721.07$ ,  $p < .001$ , CFI = .95, RMSEA = .03, and this model did not show a.

Table 3. 2: Descriptives and Inter-Correlations Between All Study Variables in the UK and Chile (Study 2)

	M	SD	2	3	4	5	6	7	8	9	10	11	12	13	14
<i>UK participants</i>															
1. Extrinsic (versus intrinsic) life goals (E/I) T1	-1.48	0.60	.83**	.76**	-.22**	-.26**	-.18**	-.36**	-.37**	-.32**	-.28**	-.25**	-.28**	-.16**	-.12**
2. Extrinsic (versus intrinsic) life goals (E/I) T2	-1.53	0.59		.84**	-.19**	-.23**	-.18**	-.33**	-.37**	-.33**	-.25**	-.27**	-.28**	-.15**	-.10*
3. Extrinsic (versus intrinsic) life goals (E/I) T3	-1.54	0.57			-.18**	-.23**	-.20**	-.32**	-.31**	-.31**	-.22**	-.25**	-.28**	-.16**	-.08*
4. Environmental worldviews T1	3.74	0.55				.77**	.77**	.39**	.36**	.33**	.40**	.41**	.38**	.13**	.07*
5. Environmental worldviews T2	3.72	0.57					.80**	.38**	.35**	.30**	.33**	.41**	.35**	.07	.03
6. Environmental worldviews T3	3.72	0.55						.38**	.36**	.32**	.33**	.40**	.41**	.05	.02
7. Environmentally responsible behaviour T1	3.54	0.56							.82**	.75**	.38**	.38**	.35**	.19**	.02
8. Environmentally responsible behaviour T2	3.62	0.55								.83**	.36**	.39**	.36**	.16**	.00
9. Environmentally responsible behaviour T3	3.60	0.53									.28**	.31**	.29**	.13**	.01
10. Environmental identification T1	3.79	0.92										.69**	.67**	.12**	.12**
11. Environmental identification T2	3.81	0.95											.76**	.12**	.10*
12. Environmental identification T3	3.82	0.94												.01*	.15**
13. Gender (female percentage) T1															-.13**
14. Age T1	44.68	13.98													
<i>Chilean participants</i>															
	M	SD	2	3	4	5	6	7	8	9	10	11	12	13	16
1. Extrinsic (versus intrinsic) life goals (E/I) T1	-1.44	0.69	.65**	.78**	-.10	-.16	-.08	-.24**	-.30**	-.35**	-.02	-.10	-.12	-.19**	-.11
2. Extrinsic (versus intrinsic) life goals (E/I) T2	-1.46	0.66		.87**	-.09	-.31**	-.07	-.23*	-.33**	-.30**	-.10	-.15	-.17	-.17	-.07
3. Extrinsic (versus intrinsic) life goals (E/I) T3	3.79	0.47			-.08	-.24*	-.17	-.18	-.33**	-.29**	.05	-.13	-.16	-.11	-.16
4. Environmental worldviews T1	3.78	0.46				.62**	.52**	.29**	.41**	.31**	.43**	.25**	.31**	.16**	.04
5. Environmental worldviews T2	3.72	0.50					.54**	.25**	.38**	.39**	.36**	.34**	.32**	.06	.01
6. Environmental worldviews T3	3.02	0.64						0.13	.31**	.24**	.26**	.38**	.45**	.09	.00
7. Environmentally responsible behaviour T1	3.31	0.69							.67**	.74**	.36**	.32**	.31**	.17**	.03
8. Environmentally responsible behaviour T2	3.25	0.72								.76**	.31**	.41**	.46**	.27**	.00
9. Environmentally responsible behaviour T3	4.03	0.89									.36**	.44**	.33**	.07	.15
10. Environmental identification T1	4.05	0.79										.63**	.60**	.11	.11
11. Environmental identification T2	3.98	0.84											.69**	.01	.32
12. Environmental identification T3	0.53	0.5												-.02	.15
13. Gender (female percentage) T1															-.09
14. Age T1	37.96	10.44													

† p &lt; .10, \* p &lt; .05, \*\* p &lt; .01, \*\*\* p &lt; .001

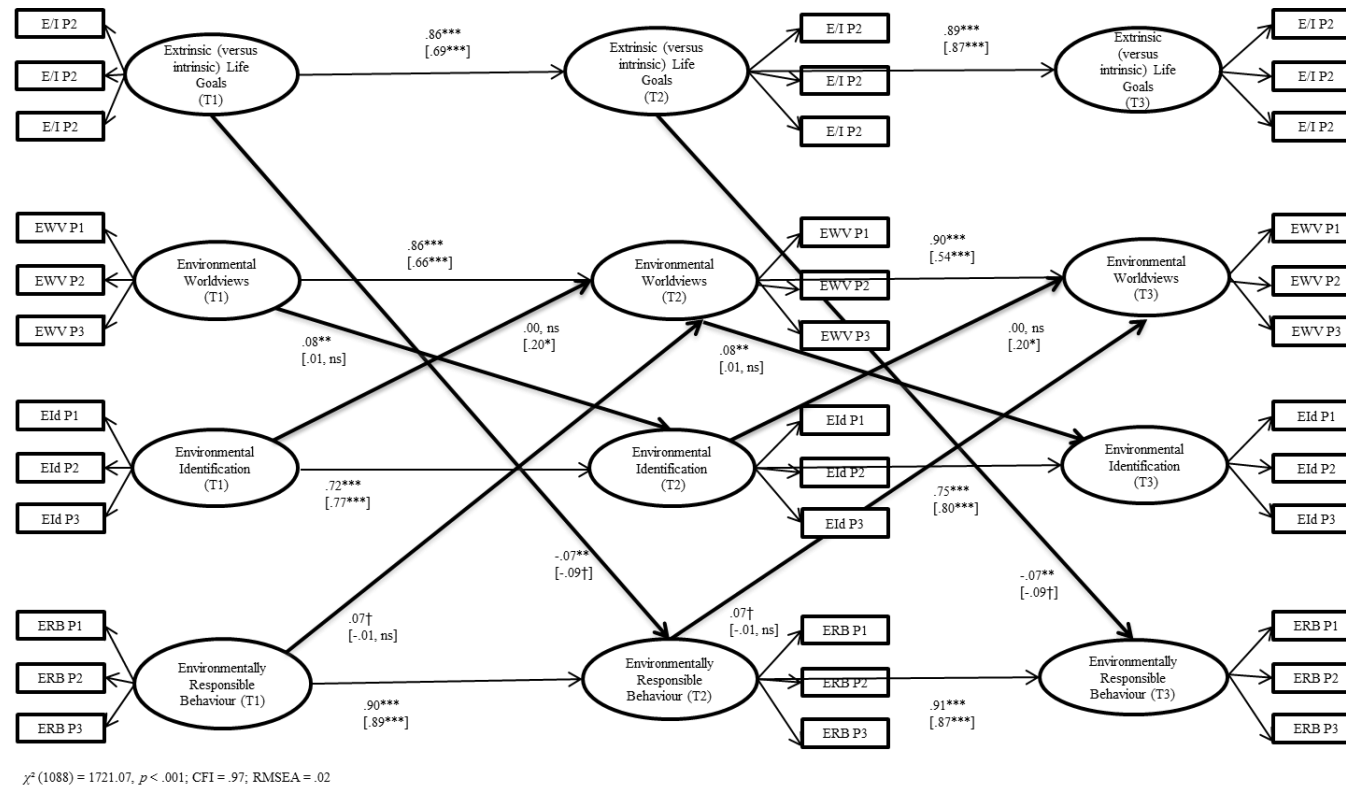


Figure 3. 2: Cross-lagged multigroup model for the associations between extrinsic (versus intrinsic) life goals, environmental worldviews, environmental identification and environmentally responsible behaviour in the UK and Chile.

Note: Coefficients shown are standardized paths. Chilean coefficients are in brackets. Error terms and items loadings are not shown to enhance visual clarity. Factor loadings were all acceptable ranging from .60 to .92 in the UK and from .55 to .94 in Chile. Covariances between our core variables in T1 and covariances between the residuals terms of the latent variables in T2 and T3 are also not shown to enhance visual clarity. Paths are only shown when we found significant paths in at least one country. E/I = Extrinsic (versus intrinsic) life goals; EWV = Environmental worldviews; EId= environmental identification; ERB = environmentally responsible behaviour; ti = wave time (T1 = wave 2010; T2 = wave 2011; and T3 = wave 2012); Pi = parcel (i); †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$ .

significant decrease in fit compared to a model where all structural paths were estimated freely,  $\Delta\chi^2(32) = 41.03, p = .13$ . Results are shown in Figure 3.3<sup>10</sup>.

We found that extrinsic (versus intrinsic) life goals were a significant and negative predictor of environmentally responsible behaviour in the UK,  $\beta = -.07, p < .01$ . In Chile, the corresponding effect was of similar magnitude, although it only reached marginal significance,  $\beta = -.09, p = .09$ . In contrast, pro-environmental worldviews did not significantly predict environmentally responsible behaviour either in the UK ( $\beta = .01, p = .80$ ) or in Chile ( $\beta = .06, p = .25$ ). Unexpectedly, environmental identification was a marginally negative predictor of environmentally responsible behaviour in the UK ( $\beta = -.04, p = .09$ ) and non-significant in Chile ( $\beta = -.09, p = .16$ ). Thus, the results supported H1, but not H2 or H3.

Results also showed that, in the UK only, environmentally responsible behaviour positively predict pro-environmental worldviews,  $\beta = .07, p < .01$ , and that pro-environmental worldviews in turn positively predict environmental identification,  $\beta = .08, p < .01$ . In contrast, in Chile, we found that environmental identification positively predicted pro-environmental worldviews,  $\beta = .20, p < .05$ . No other prospective paths were significant.

Finally, we tested a model where we constrained the three predictors of environmentally responsible behaviour (extrinsic relative to intrinsic life goals; environmental worldviews and environmental identification) to be equal across the waves and cultures. This model continued to show a good fit:  $\chi^2(1091) = 1722.55, p < .001$ , CFI = .97, RMSEA = .02. Moreover, the constrained model did not show a significant loss of fit compared to the model with only loadings constrained,  $\Delta\chi^2(35) = 42.51, p = .18$ . Therefore, it may be concluded that culture did not significantly moderate the structural relationships between our main core variables.

## Discussion

Using cross-lagged models, Study 2 extended previous research by testing, for the first time, the prospective relationship over time between extrinsic (versus intrinsic) life goals and environmentally responsible behaviour. Our most important result is to show that a higher relative importance placed on external (relative to intrinsic) rewards was a negative antecedent of environmentally responsible behaviour, whereas the

<sup>10</sup> Although the unstandardized paths were constrained to equality, the corresponding standardized paths may differ slightly. For simplicity, in the main text we report the standardized paths from T1 to T2. Paths from T2 to T3 may be found in Figure 3.3.

reverse direction was not supported. Importantly, this link was held while controlling for the effects of environmental worldviews and environmental identification. Indeed, perhaps surprisingly, life goals were the only significant prospective predictor of environmentally responsible behaviour, whereas the other two predictors did not reach significance in either country.

Unexpectedly, we found among our UK participants that higher environmentally responsible behaviour predicted higher pro-environmental worldviews, which in turn predicted higher environmental identification. Two possible explanations may help us to understand these findings. First, self-perception theory (Bem & McConnell, 1970) suggests that “Individuals come to ‘know’ their own attitudes, emotions, and other internal states partially by inferring them from observations of their own overt behaviour and/or the circumstances in which this behaviour occurs” (p. 23). Therefore, people may base their self-concepts and worldviews in part on observing their own behaviour in order to determine what kind of person they are. Second, the theory of cognitive dissonance (Festinger, 1964) states that when a person becomes aware of their own attitudes or identifications (e.g. their worldviews or environmental identification) that are not psychologically consistent with one another (e.g., their environmental behaviour), he or she will try different options to make them more consistent with their internal psychological processes. For example, in order to feel that their behaviour is consistent with their attitudes and identities, people may sometimes change their attitudes and identities to fit the behaviour. Thus, it could be that people see themselves behaving pro-environmentally and because of that they form worldviews and identities to match their behaviour. Alternatively, it could be that people see themselves behaving *anti*-environmentally, and thus they move towards an anti-environmental worldview and identity that rationalizes their behaviour.

Finally, in Chile we found that environmental identification positively predicted pro-environmental worldviews. These finding support previous claims arguing that environmental identification reflects whether or not people indicate that the environment is a central part of who they are and therefore may motivate or reduce their attitudes and behaviour toward the environment (Gatersleben, Murtagh, et al., 2012). However, it is notable that this effect was not replicated in our much larger UK sample.

### General Discussion

The world is facing one of the biggest challenges of the 21st Century: climate change and global warming (United Nations Development Programme, 2007). The future of the environment is in serious danger, partly due to human over-consumption activities (Commission for Environmental Cooperation, 2002). If this trend continues, global temperatures will increase significantly over the coming years, which would have serious implications for the well-being of current and future generations. Therefore, public policies and political campaigns urgently need to reduce our unfriendly environmental behaviour, in order to protect the future of the world. To achieve this, policy makers firstly need to understand as deeply as possible the different factors influencing people's environmentally unfriendly behaviour.

Social psychologists have conducted valuable research regarding how we see, act and behave toward our natural environment, in order to discover how to change unfriendly ecological behaviour. However, most of the previous studies have focused on environmental attitudes, worldviews, and studies have often measured behavioural intentions (e.g., Gatersleben, Jackson et al. 2012; Gatersleben, Murthagh et al. 2012) or responses to imaginary scenarios (e.g., Sheldon et al., 2011), instead of measuring actual everyday behaviour. Therefore, if the world aims to tackle the current ecological crisis, better individual predictors influencing actual behaviour need to be understood. That was the main goal of our current paper. Crucially, our research has shown that life goals or aspirations are a more robust predictor of everyday environmental behaviour than environmental worldviews or environmental identification. This may help policy makers to create new intervention strategies seeking to modify environmentally unfriendly behaviour.

We should acknowledge several limitations of the present research. First, our measure of environmentally responsible behaviour was self-reported, and it would be desirable to complement this with observational data. Nonetheless, the behaviour measured in our index were all relatively concrete, making it easier for participants to give reasonably objective responses. Moreover, if participants' self-reports were substantially biased by self-enhancement, one might expect that bias to be closely linked to environmental identification; yet, the effects of life goals were observed here while controlling for environmental identification. Second, given that our participants were all university graduates, we should be cautious about generalizing these findings to poorer and less educated groups. Nonetheless, understanding the antecedents of

environmentally unfriendly behaviour among relatively affluent individuals is especially important, given that these individuals have the greatest resources to allow them to engage in over-consumption of natural resources. Third, despite showing strong evidence that extrinsic (versus intrinsic) life goals are a temporal antecedent of environmentally responsible behaviour rather than vice versa, our longitudinal design still does not rule out the possibility of a third, unmeasured variable that influences both constructs. Nonetheless, the results considerably strengthen the case for a causal path from life goals to environmentally responsible behaviour, not only because they established temporal precedence but also by controlling for the possible influence of two key competing predictors: pro-environmental worldviews and environmental identification.

Our current consumer culture tells us every day that material rewards and extrinsic life goals are the pathway to happiness and well-being. However, extending previous research showing that a higher relative importance attached to extrinsic life goals is negative for people's well-being (reviewed by Dittmar et al., in press), we have shown that this materialistic way of living is also dangerous for the future of our natural world. Through correlational (Study 1) and longitudinal (Study 2) evidence, we found support for arguments that attaching a higher importance to the pursuit of extrinsic (relative to intrinsic) life goals has more wide-ranging negative consequences than previously acknowledged. Extrinsic (versus intrinsic) life goals not only affect negatively people's well-being, but also lead to more environmentally unfriendly behaviour. Indeed, the effect of life goals turned out to be more robust than those of two highly plausible alternative predictors: environmental worldviews and environmental identification. Therefore, policy makers need to pay special attention to the role of our current consumer culture in order to protect the future of the globe, encouraging people to live a more intrinsic and meaningful life (Brown & Kasser, 2005). Contemporary societies need to change from a materialistic way of living to a more sustainable way of living. We hope this research helps to develop public policies that teach people how to live in harmony with nature and how to protect our natural world for the benefit of future generations.

## CONCLUSIONS

### General Conclusions

Despite the enormous economic and technological progress the world has seen in recent decades, our current model of development has reached its limits, leading us to ecological, social and economic crises that are putting at risk the future of humankind and the planet (Sachs, 2012; SNDP, 2013). Poverty, inequalities, mental and physical health problems and the ecological crisis are putting at risk the survival of humanity and the planet. In these problems, the persistent creation of new material “wants” through our current consumer culture has played a negative key role (Dittmar, 2008; Kasser & Kanner, 2004; Sachs, 2012).

Fortunately, there is a growing consensus on the need and urgency for a model of *sustainable development* which would help to protect the future of our natural environment, as well as leading societies and people to flourish (Diener, Lucas, Schimmack, & Helliwell, 2009; Seligman, 2011; Stiglitz, Sen, Fitousi, 2010; United Nations, 2011).

This new *sustainable development* model is closely linked to the search for happiness (Layard, 2011; Sachs, 2012). In fact, it has been shown (Diener & Tay, 2012) that happier people tend to be more sociable, friendlier, and more cooperative. Moreover, people scoring higher in subjective well-being (SWB) tend to have better social relationships, higher levels of trust and community involvement, and greater willingness to support people in need. Therefore, happier people are more likely to fight harder against poverty and inequalities, to have better physical and mental health and to protect their communities. In addition, individuals higher in SWB tend to report higher environmentally responsible behaviour, which shows that happiness and sustainability may actually be complementary (Brown & Kasser, 2005).

Thus, a better understanding of the underlying mechanisms that lead people to be happier and to be more environmentally friendly is a key issue for research and for public policies. This is the main reason why I decided to start the research that is reported in this thesis.

There are several factors that influence happiness and well-being. Among them, values and life goals play a key role (Layard, 2011; Layard, Clark, & Senik, 2012). For example, it has been found that materialistic values are associated with lower levels of happiness and SWB (Dittmar, Bond, Kasser, & Hurst, in press). Moreover, materialism



has also been associated with lower environmentally friendly behaviour. However, previous research studying the link between materialism and well-being and the link between materialism and environmental behaviour still present several important gaps.

Regarding the link between materialism and well-being, there are four important research gaps. First, previous studies on materialism, need satisfaction and well-being have failed to take the potential mediational role of need frustration explicitly into account. Second, previous studies were grounded only in the SDT tradition, and thus were limited by relying on intrinsic-extrinsic goal measures. Third, there has been a lack of research into these constructs and processes in South American countries (Dittmar et al., in press). Fourth, and finally, most previous studies on the link between need satisfaction and well-being have employed methods that do not allow inferences about cause-effect relations.

Regarding the link between materialism and environmental behaviour, the existing evidence has been limited to a relatively small number of cross-sectional studies, and until now it has remained unclear to what extent intrinsic (versus extrinsic) life goals are causally implicated in environmentally responsible behaviour.

Hence, in my research for this thesis I decided to focus on materialism and its links with need satisfaction, need frustration, well-being and environmental behaviour. My results contribute to a better understanding of the effect of materialistic values and extrinsic (versus intrinsic) life goals on people's well-being, but also on the future of the natural environment. The results of this thesis may help not only to increase scientific knowledge about these psychological processes, but also to assist policy makers to create public policies in order to tackle the major challenges that the world is currently facing.

It is important to notice that despite the great interest in the study of materialism across history, the way that different scientific disciplines have conceptualised this construct tends to differ significantly. In my research, I decided to conceptualise materialism from a psychological approach, measuring it at the individual level. The advantage of this approach is that both the scales I used fully capture the influence of the consumer culture, the shared meaning of materialism, and the differences in the extent to which individuals endorse materialistic values in a nation or in a society (Dittmar, 2008).

Results reported in Paper 1 highlighted the role that materialism may play in positive and negative well-being in both the UK – a mass consumer society – and in

Chile – a country in fast transition. I found that higher levels of materialism were associated with lower need satisfaction and higher need frustration, which in turn were associated with lower positive and higher negative well-being respectively. These results were held across both cultures, giving support to SDT postulates (Deci & Ryan, 2000). This suggests that, if societies and policy makers desire to increase human happiness in order to tackle the current world's problems, they need to give special attention to the materialistic values that our current consumer culture is transmitting.

The most prominent theoretical explanations for the negative link between materialism and well-being has been developed by SDT through the hypothesized mediation of the three basic psychological needs. However, most of previous studies on the link between need satisfaction and well-being do not allow inferences about cause-effect relations. Therefore, studying the correct direction of this link is crucial for understanding the possible mediation role played by need satisfaction in the link between materialism and well-being. Paper 2 approach this issue, focusing in detail on one part of the broader structural model tested in Paper 1—namely the relationship between basic psychological needs and well-being.

Paper 2 highlighted the key role of basic psychological need satisfaction and frustration in people's well-being and happiness. I found that in both countries, total need satisfaction was a positive prospective predictor of well-being. However, when I split need satisfaction in its three needs, only relatedness reached statistical significance in the UK. In Chile, none of the three needs was an individually significant prospective predictor of well-being. These results may question the hypothesized direction of the link from materialism to well-being through the mediation of need satisfaction. However, more research is needed employing all of these constructs together. Finally, I found a bi-directional positive link between need satisfaction and subjective well-being. These results point towards a better integration of research into hedonic and eudaimonic well-being.

The results of Paper 3 extended previous key findings on values and behaviour (Stern & Dietz, 1994; Schwartz, 1992, 2006). To date, previous research has shown that materialistic values are negatively associated to pro-environmental behaviour. However, according to my knowledge, the main explanations about these negative associations are often based on either Schwartz's (1992) or on Stern and Dietz (1994) work. However, neither Schwartz (1992) nor Stern and Dietz (1994) measured materialism directly leaving an important research gap. Moreover, their measures of general values did not

capture the influence of our current consumer culture on the environment. Our paper extends their results by measuring materialism directly from a social psychological approach that fully captures the influence of our consumer culture on environmental behaviour. Our results highlight the importance of promoting intrinsic values in order to protect the well-being of the future generations.

It also extended previous research by showing that a higher relative importance placed on external (versus intrinsic) rewards was a negative antecedent of environmentally responsible behaviour. Importantly, this predictive effect was shown while controlling for the effects of environmental worldviews and environmental identification. This key result was found not only in the UK, but also in Chile. Analyzing the link between life goals and self-reports of actual behaviour in the UK, a mass established consumer society, and Chile, a South American country in fast economic transition, is of much interest. Chilean's fast economic growth (United Nations Development Programme, 2010) may provide new opportunities for a larger number of people in the country to do more damage to the environment, making this an especially important context in which to study these processes. Our results suggest that the negative consequences of attaching higher importance to material and external rewards may be found across nations.

Values and life goals may be transmitted mainly by parents, educators, mass media, and different organizations in society. So far, consumer culture has mainly transmitted extrinsic and materialistic values which have negatively affected people's well-being and happiness, as well as the sustainability of our natural environment (Brown & Kasser, 2005; Commission for Environmental Cooperation, 2002; Crompton & Kasser, 2009; Sachs, 2012; SNDP, 2013). Therefore, there is a key role for societies, governments and policy makers in systematically teaching intrinsic values in order to decrease the negative effects of our current consumer culture (Helliwell, Layard and Sachs, 2012). People across the world urgently need to start giving more emphasis to the promotion of intrinsic values and life goals. By doing so, we may be able to foster greater happiness and well-being, which in turn may help to reduce poverty, inequalities, social exclusion, and mental and physical problems. Moreover, by promoting intrinsic values, we have a direct path to reducing unfriendly ecological behaviour, which in turn may help to halt our current environmental crisis.

### **Possible Limitations and Future Directions**

I should acknowledge several limitations of the present thesis. First, given that all participants were university graduates in both countries, we should be cautious about generalizing these findings to poorer and less educated groups. Moreover, our research was conducted in just one Western European and one South American nation, which is why different samples and cultures need to be explored in further research. However, a recent meta-analysis (Dittmar et al., in press) examining the association between materialism and personal well-being across 216 independent samples, showed that the negative association was robust across a variety of studies, samples and economic conditions, at least cross-sectionally. Moreover, understanding the antecedents of environmentally unfriendly behaviour among relatively affluent individuals is especially important, given that these individuals have the greatest resources to allow them to engage in over-consumption of natural resources.

Second, despite the strong evidence regarding the link between materialism and well-being, one important limitation of Paper 1 involves its correlational design, which does not allow one to infer causality. Although higher materialism may produce lower well-being due to the mediating role of need satisfaction and need frustration (Kasser & Ryan, 1993, 1996; Ryan & Deci, 2000), it is also possible that unhappy people seek materialistic ways in which to improve their situation and overcome their problems (Dittmar, 2008). The bi-directional link between total need satisfaction and well-being found in Paper 2 (UK) provides initial evidence for there being more than just a unidirectional pathway from aspirations through basic need satisfaction to well-being. However, further longitudinal research needs to be carried out in order to evaluate the directionality of the link whole between materialism, need satisfaction and well-being over time.

Third, method variance might play a role in Paper 1 and in Paper 2. For example, method effects may be driving the observed associations between the need satisfaction – positive well-being effect and the need frustration – negative well-being effect. Therefore, further research needs to include a range of different informants to overcome this problem (e.g., parents, teachers, etc.).

Fourth, despite showing some evidence that need satisfaction is a temporal antecedent of people's well-being (and vice versa), and clear evidence that extrinsic (versus intrinsic) life goals are a temporal antecedent of environmentally responsible behaviour, our longitudinal designs still do not rule out the possibility of a third, unmeasured variable that may influence our constructs. Nevertheless, our cross-lagged

results significantly strengthen the case for the proposed causal links between the core variables, because they established temporal precedence.

Fifth, in all the studies, all my measures were all self-reported, and it would be desirable to complement this with observational data. Nonetheless, in the case of Paper 3, the behaviours measured in our index were all relatively concrete, making it easier for participants to give reasonably objective responses.

Sixth, and finally, I did not analyse to what extent the different materialism subscales/sub-constructs are differently related to the outcomes variables. This is a key issue, especially in the case of the Aspiration index. For example it would be important to study which specific goals are driving the main effects in terms of need satisfaction, need frustration, well-being and environmental behaviour. Therefore, further research is needed to explore this issues.

In terms of future directions, I think there is an important role to be played by media analysis in future research. For example, as explained in my thesis, materialism may reside not only at the individual level, but also at the societal level due that the cultural environment may have a key influence on our materialistic values. However, if this assumption is true, an important question raised by Tim Kasser become a key issue to explore. If the whole of society has been exposed to the same cultural messages, why do not all of us internalise materialistic values in the same way? Kasser (2002) states that maybe it is due to the fact that not all of us are exposed to the same *consumer culture* messages. For example, “people are likely to be materialistic if they watch a great deal of television and if their parents value materialistic goals” (p. 27). Thus, some people may learn this attitude because of the environment (Kasser, 2002). This hypothesis has been confirmed in Dittmar et al’s. (in press) recent meta-analysis. The authors found that at the cultural level, the negative associations between materialism and well-being is amplified when people live in a culture where it is possible to observe frequent exposure to consumer culture’s ideologies. Later arguments lead to conclude that there is an important role for media analyses. Studying the influence of the media on materialism could be an important tool for researchers. Media exposure studies and multilevel cross-cultural studies using many different cultural samples, could be used to unpack the differential effects of being a materialistic individual and of living in a materialistic context.

Finally, future research using “environmental identification” measures requires more critical attention. As mentioned in my thesis, there is a growing interest in the study of a “connection to, engagement with, or identification with the natural environment” (Sparks et al., 2014, p. 167). However, there are still important ambiguities in the field. Thus, the way I conceptualised my environmental identification measure requires more critical attention because three important questions arise. First, what is its relationship between what I measured in terms of “identification” and “connectedness”? To what extent is my identity measure a pure measure of identification or it is a mix of identification and connectedness items? In fact, Sparks et al. (2014) developed a measure of connectedness where identification was a key element. Therefore, further research should help to clarify these ambiguities still present in the field. Moreover, my scale assesses both cognitive and affective elements. However, the research is not clear yet about the role that both should have on an environmental identification scale. For example, is it really important to make a clear distinction between cognitive and affective elements? If yes, maybe it would be useful to carry out factor analysis to analyse how different the implications of each dimension are. For example, would it be possible that affective processes mediate the link between cognitions and behaviour as hypothesised by Sparks et al. (2014)? Second, following Hinds and Sparks (2008), the measure I used in my thesis reflects a more personal than social form of identification of identification with the natural environmental. Therefore, it may be interesting for further research to explore the same constructs explored in Paper 3, but using a more social or role-based identity approach. That is because it has been hypothesised that the inclusion of other forms of identity may help to increase the explained variance in the models (Hinds & Sparks, 2008). Third, and finally, it has also been stated that the strength of an environmental identification measure is related to how close participants have been physically connected to the natural environment (Hinds & Sparks, 2008). For example, Hinds and Sparks (2008) argue that the exposure to the natural environment may increase the identification with it. In fact, it has been found that environmental identity increased significantly for marginalized adolescents after an immersed experience in woodlands (Hinds, 2011). Similarly, Manzo (2003) hypothesised that our relationships (identifications) to the outside world – such as the natural environment – reflect, at least in part, people’s collected experiences of the outside world. However, I did not control for this factor in my thesis. Therefore, further research should check the degree to which participants have been exposed to the natural

environment. In summary, all these ambiguities point out the need for more research in the field of environmental identification.

### **Final Conclusion**

Through the analyses that I have presented in this thesis, I have shown that materialistic values and extrinsic (versus intrinsic) life goals are negatively linked to well-being through the mediation of need satisfaction and need frustration. Secondly, I have shown that higher need satisfaction and lower need frustration prospectively predict higher well-being and vice versa. Finally, I have demonstrated that extrinsic (versus intrinsic) life goals are associated, both correlationally and longitudinally, with lower environmentally friendly behaviour. These results highlight the importance of public policies that promote intrinsic values and life goals in order to decrease the negative effects of our current consumer culture and to foster people's subjective well-being and mental and physical health. By making people happier, public policies may help to reduce poverty, inequalities and mental and physical problems, and to protect our natural environment for the benefit of future generations.

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## APPENDIX 1

The questionnaire below was reproduced from the original online version. The data were employed for the studies reported in Papers 1, 2 and 3.

### **International Research Project on Consumer Culture, Environment, Life Goals, and Well-Being in the UK and Chile**

#### **Information Sheet**

This research project examines people's personal views about topics of current concern and debate: consumer culture, personal aspirations and motivations, environmental behaviours and attitudes, as well as well-being. There are no right or wrong answers; we are interested in your **personal views**. This is an important research area: we need a better understanding of factors that can have an impact on our well-being.

Your responses will be anonymous, all data will be kept confidential, and will only be used for academic purposes related to this study. You are free to withdraw from participating in this research project at any time. However, your personal views are very important to us, and we hope that you will find it interesting to reflect on contemporary consumer culture and your place within in. The questionnaire takes about 20-25 minutes to complete.

For further information on this topic and/or if you wish to obtain the results of the study, you can contact me, the researcher, at [wu20@sussex.ac.uk](mailto:wu20@sussex.ac.uk).

We are grateful to the Alumni offices at both universities, University of Sussex and Universidad Adolfo Ibanez Business School which have made it possible for us to contact you. We hope you will welcome the opportunity to take part in an important research project at your own university.

Your participation is invaluable.

If you complete the survey within 3 days, you will be entered into a prize draw for University of Sussex memorabilia.



Your help is very much appreciated

Wenceslao Unanue (Researcher)

### **Participant Consent Form**

Name of Investigator: Wenceslao Unanue

1. I agree to take part in the “International Research Project on Consumer Culture, Environment, Life Goals, and Well-Being in the UK and Chile” University of Sussex research project. I have had the project explained to me and I have read and understood the Information Sheet, which I may print for records.
2. I authorise the investigator to use the questionnaire referred to under (1) above.
3. I acknowledge that:
  - a. I have been informed that I am free to withdraw from the project at any time and to withdraw any unprocessed data previously supplied, before or after the close of the project;
  - b. I am free to withdraw from the project at any time without giving reason or incurring any subsequent penalties;
  - c. The project is for the purpose of research and/or teaching;
  - d. I have been informed that the confidentiality of the information I provide will be safeguarded, and that all personal information provided by myself will remain confidential. No information that identifies me will be made publicly available.

I consent to the processing of my personal information for the purposes of this research study. I understand that such information will be treated as strictly confidential and handled in accordance with the Data Protection Act 1998.

Please click on “Continue” if you agree with all the above points to start the study.

***[consent button]***

**In this section we are interested in different aspects of your personal well-being**

1. Please indicate the extent to which you (dis)agree with each of the statements below, using the following scale.

1	2	3	4	5	6
Strongly disagree	Disagree	Disagree a little	Agree a little	Agree	Strongly agree

- a. \_\_\_\_ In most ways my life is close to my ideal.
- b. \_\_\_\_ The conditions of my life are excellent.
- c. \_\_\_\_ I am satisfied with my life.
- d. \_\_\_\_ So far I have gotten the important things in my life.
- e. \_\_\_\_ If I could live my life over, I would change almost nothing.

2. Please indicate how often you have felt or behaved in each of the following ways during the past week using the scale below.

Rarely or none of the time (less than 1 day)	Some or a little of the time (1-2 days)	Occasionally or a moderate amount of time (3-4 days)	Most or all of the time (5-7 days)
0	1	2	3

- a. \_\_\_\_ I did not feel like eating; my appetite was poor
- b. \_\_\_\_ I felt that I couldn't stop feeling down even with help from my family or friends
- c. \_\_\_\_ I felt that I was just as good as other people
- d. \_\_\_\_ I had trouble keeping my mind on what I was doing
- e. \_\_\_\_ I felt depressed
- f. \_\_\_\_ I felt that everything I did was an effort
- g. \_\_\_\_ I felt hopeful about the future
- h. \_\_\_\_ I thought my life had been a failure
- i. \_\_\_\_ My sleep was restless
- j. \_\_\_\_ I was happy
- k. \_\_\_\_ I talked less than usual

- l. \_\_\_\_ I felt lonely
- m. \_\_\_\_ I enjoyed life
- n. \_\_\_\_ I had crying spells
- o. \_\_\_\_ I felt sad
- p. \_\_\_\_ I felt that people disliked me

3. We would like to know how often you have felt different feelings and emotions during the last month. Using the scale below, please indicate how frequently you have felt each.

1	2	3	4	5
Never	Seldom	Sometimes	Often	Always

- a. \_\_\_\_ Upset
- b. \_\_\_\_ Hostile
- c. \_\_\_\_ Alert
- d. \_\_\_\_ Ashamed
- e. \_\_\_\_ Inspired
- f. \_\_\_\_ Nervous
- g. \_\_\_\_ Determined
- h. \_\_\_\_ Attentive
- i. \_\_\_\_ Afraid
- j. \_\_\_\_ Active

4. Please respond to each of the following statements by indicating the degree to which the statement is true for you (or not) over the **past month**. Please answer from 1 to 7 (1 = not at all true, 4 = somewhat true, 7 = very true).

1	2	3	4	5	6	7
Not at all			Somewhat			Very true
true			true			

- a. \_\_\_ I feel alive and vital.
- b. \_\_\_ I don't feel very energetic.
- c. \_\_\_ Sometimes I feel so alive I just want to burst.
- d. \_\_\_ I have energy and spirit.
- e. \_\_\_ I look forward to each new day.
- f. \_\_\_ I nearly always feel alert and awake.
- g. \_\_\_ I feel energized.

5. We are interested in your health **over the past month**. Please indicate, using the scale below, whether have you recently...

1	2	3	4	5
Never	Seldom	Sometimes	Often	Always

- a. \_\_\_ been feeling perfectly well and in good health?
- b. \_\_\_ been feeling in need of a good tonic?
- c. \_\_\_ been feeling run down and out of sorts?
- d. \_\_\_ felt that you are ill?
- e. \_\_\_ been getting any pains in your head?
- f. \_\_\_ been getting a feeling of tightness or pressure in your head?
- g. \_\_\_ been having hot or cold spells?

6. Now we would like to ask you about your happiness<sup>11</sup>.

<sup>11</sup> This question was asked only in waves 2 and 3.

Taking all things together, how happy are you? Please rate your answers from 0 (extremely unhappy) to 10 (extremely happy) where 5 indicates that you are neither unhappy nor happy.

0	1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	---	----

7. Please rate your (dis)agreement with each of the following statements, thinking about **the last month**. Please use the scale below.

1	2	3	4	5	6
Strongly disagree	Disagree	Disagree a little	Agree a little	Agree	Strongly agree

- a. \_\_\_\_ I felt a sense of contact with people who care for me, and whom I care for.
- b. \_\_\_\_ I was lonely.
- c. \_\_\_\_ I felt close and connected with other people who are important to me.
- d. \_\_\_\_ I felt unappreciated by one or more important people.
- e. \_\_\_\_ I felt a strong sense of intimacy with the people I spent time with.
- f. \_\_\_\_ I had disagreements or conflicts with people I usually get along with.
- g. \_\_\_\_ I was successfully completing difficult tasks and projects.
- h. \_\_\_\_ I experienced some kind of failure, or was unable to do well at something.
- i. \_\_\_\_ I took on and mastered hard challenges.
- j. \_\_\_\_ I did something stupid, that made me feel incompetent.
- k. \_\_\_\_ I did well even at the hard things.
- l. \_\_\_\_ I struggled doing something I should be good at.
- m. \_\_\_\_ I was free to do things my own way.
- n. \_\_\_\_ I had a lot of pressures I could do without.
- o. \_\_\_\_ My choices expressed my "true self."
- p. \_\_\_\_ There were people telling me what I had to do.
- q. \_\_\_\_ I was really doing what interests me.
- r. \_\_\_\_ I had to do things against my will.

Take a minute to think about something that you would like to change, or improve a little, about yourself and your life. It could be anything at all.

Then, after completing the sentences, please indicate for each:

- Please complete this procedure four times. Each of the four sentences represents something that you would like to change, or improve a little, about yourself and your life.

[illegible]

**II. In this section we are interested in different aspects of the consumer culture and in your personal life goals**

8. Everyone has long-term goals or aspirations of what they hope to accomplish over the course of their lives. In this section, you will find different life goals, presented one at a time. Please rate how important each goal is to you personally (1 = not at all, 4 = moderately, 7 = very).

1	2	3	4	5	6	7
Not at all			Moderately			Very

- a. \_\_\_ To be a very wealthy person.
- b. \_\_\_ To grow and learn new things.
- c. \_\_\_ To have my name known by many people.
- d. \_\_\_ To have good friends that I can count on.
- e. \_\_\_ To successfully hide the signs of aging.
- f. \_\_\_ To work for the betterment of society.
- g. \_\_\_ To have many expensive possessions.
- h. \_\_\_ At the end of my life, to be able to look back on my life as meaningful and complete.
- i. \_\_\_ To be admired by many people.
- j. \_\_\_ To share my life with someone I love.
- k. \_\_\_ To have people comment often about how attractive I look.
- l. \_\_\_ To assist people who need it, asking nothing in return.
- m. \_\_\_ To be financially successful.
- n. \_\_\_ To choose what I do, instead of being pushed along by life.
- o. \_\_\_ To be famous.
- p. \_\_\_ To have committed, intimate relationships.
- q. \_\_\_ To keep up with fashions in hair and clothing.
- r. \_\_\_ To work to make the world a better place.
- s. \_\_\_ To be rich.
- t. \_\_\_ To know and accept who I really am.
- u. \_\_\_ To have my name appear frequently in the media.
- v. \_\_\_ To feel that there are people who really love me, and whom I love.

- w. \_\_\_\_ To achieve the "look" I've been after.
- x. \_\_\_\_ To help others improve their lives.
- y. \_\_\_\_ To have enough money to buy everything I want.
- z. \_\_\_\_ To gain increasing insight into why I do the things I do.
- aa. \_\_\_\_ To be admired by lots of different people.
- bb. \_\_\_\_ To have deep enduring relationships.
- cc. \_\_\_\_ To have an image that others find appealing.
- dd. \_\_\_\_ To help people in need.

9. Please indicate the extent to which you agree with the following statements, using the scale below.

1	2	3	4	5	6
Strongly disagree	Disagree	Disagree a little	Agree a little	Agree	Strongly agree

- a. \_\_\_\_ I admire people who own expensive homes, cars, and clothes (Success)
- b. \_\_\_\_ The things I own say a lot about how well I'm doing in life (Success)
- c. \_\_\_\_ I like to own things that impress people (Success)
- d. \_\_\_\_ I try to keep my life simple, as far as possessions are concerned (Centrality)
- e. \_\_\_\_ Buying things gives me a lot of pleasure (Centrality)
- f. \_\_\_\_ I like a lot of luxury in my life (Centrality)
- g. \_\_\_\_ My life would be better if I owned certain things I don't have (Happiness)
- h. \_\_\_\_ I'd be happier if I could afford to buy more things (Happiness)
- i. \_\_\_\_ It sometimes bothers me quite a bit that I can't afford to buy all the things I'd like (Happiness).

### III. In this section we are interested in your views about the environment.

10. Please read through all the statements below first. Once you have done this, for each statement, please indicate the extent to which you agree with them, using the scale below.



1	2	3	4	5
Strongly disagree	Mildly disagree	Unsure	Mildly agree	Strongly Agree

- a. We are approaching the limit of the number of people the earth can support.
- b. Humans have the right to modify the natural environment to suit their needs.
- c. When humans interfere with nature it often produces disastrous consequences.
- d. Human ingenuity will insure that we do NOT make the earth unliveable.
- e. Humans are severely abusing the environment.
- f. The earth has plenty of natural resources if we just learn how to develop them.
- g. Plants and animals have as much right as humans to exist.
- h. The balance of nature is strong enough to cope with the impacts of modern industrial nations.
- i. Despite our special abilities humans are still subject to the laws of nature.
- j. The so-called "ecological crisis" facing humankind has been greatly exaggerated.
- k. The earth is like a spaceship with very limited room and resources.
- l. Humans were meant to rule over the rest of nature.
- m. The balance of nature is very delicate and easily upset.
- n. Humans will eventually learn enough about how nature works to be able to control it.
- o. If things continue on their present course, we will soon experience a major ecological catastrophe.
- p. I see myself as someone who empathises with the natural environment.
- q. For me, engaging with the natural environment gives me a greater sense of who I am.
- r. I identify with the natural environment.

11. For each of the following behaviours, please indicate how often you engage in it, using the scale below.

1	2	3	4	5
Never	Seldom	Sometimes	Often	Always

- a. I drive my car in or into the city, even when there are other forms of transport.
- b. I ride a bicycle or take public transportation to work or school.
- c. If I am offered a plastic bag in a store, I take it.
- d. I kill insects with a chemical insecticide.
- e. I buy convenience foods.
- f. I talk with friends about problems related to the environment.
- g. I boycott companies with an unecological background.
- h. In hotels, I have the towels changed daily.
- i. In the winter, I keep the heat on so that I do not have to wear a sweater.
- j. I put dead batteries in the garbage.

12. In the following section we are interested in your environmental knowledge. There are only one correct answer to each question<sup>12</sup>.

- a. *Global warming also has an effect on the Gulf Stream that will affect Europe. What is this effect?*

The Gulf Stream will possibly lead to additional warming of the climate.

The Gulf Stream will possibly collapse, which will lead to a strong cooling of the climate.

- b. *If all ozone-destroying emissions were eliminated right now, how long would it take for almost complete regeneration of the ozone layer?*

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<sup>12</sup> This question was asked only in Wave 1.

- 10 years
- 100 years
- 1000 years

*c. The world population today is 6 billion. What will the world population be in the year 2025, approximately?*

- 6.5 billion
- 2. 8 billion
- 3.12 billion

*d. Oranges from Israel is environmentally harmful because...*

- Climatic conditions are disadvantageous for growing oranges in Israel
- Too much packaging material is used
- Air transport consumes excessive amounts of energy

*e. If ozone warnings are issued in the summer time, you should not drive because...*

- Summer smog will be produced
- Otherwise, the ozone hole will increase
- Due to the warm weather, the engine will give off more pollutants

*f. True or false? In organic farming, no chemical or synthetic pesticides are used whatsoever.*

- True
- False

*g. True or false? Incineration of waste is generally preferable to landfilling of waste.*

- True
- False

*h. Meat as compared to vegetables (in amounts containing the same number of calories) is...*

Twice as damaging to the environment

Ten times as damaging to the environment

*i. To travel 1 km (1 mile), how much more energy is consumed per person by airplane as compared to by train?*

Twice as much energy per person by airplane

Ten times as much energy per person by airplane

*j. To travel 1 km (1 mile), how much more energy is consumed per person by car as compared to by train?*

Twice as much energy per person by car

Ten times as much energy per person by car

13. Thank you so much for your participation in this online survey. All we need now is some general information about you. This is simply to ensure that we are getting responses from a wide range of different people. All details given are completely confidential.

1. Gender    male\_\_\_\_        female\_\_\_\_
2. Age (in years)\_\_\_\_\_
3. Ethnic background\_\_\_\_\_
4. Occupation \_\_\_\_\_
5. Height (cm)\_\_\_\_\_
6. Weight (Kg)\_\_\_\_\_
  
7. Personal gross annual salary\_\_\_\_\_

1 = < 20,000

2 = 20,000 – 29,999

3 = 30,000 – 39,999

4 = 40,000 – 60,000

5 = > 60,000

8. Relationship status

\_\_\_Single

\_\_\_Married

\_\_\_Divorced

\_\_\_Co-habiting

\_\_\_Separated

\_\_\_Widow/Widower

\_\_\_Civil partnership

Thank you again for your time and help!

Your participation is invaluable for us. Please enter your email address again here so that we can send you feedback about the results of this research (email addresses will be linked to questionnaires only through a code number to protect anonymity). In addition, your email address is extremely important to analyse your anonymous answers over the time. Please don't forget to include it correctly.

E- mail:

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Please confirm your email address:

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## APPENDIX 2

## Descriptives and Inter-Correlations Between All Study Variables in the UK and Chile

Table 2. 1: Descriptives and Inter-Correlations Between All Study Variables in the UK

	1	2	3	4	5	6	7	8	9	10	11	12
<i>UK participants</i>												
1. Total Basic Need satisfaction T1	1.00***	.63***	.62***	.82***	.56***	.57***	-.87***	-.51***	-.52***	.81***	.51***	.50***
2. Total Basic Need satisfaction T2		1.00***	.69***	.56***	.84***	.58***	-.52***	-.87***	-.62***	.50***	.84***	.58***
3. Total Basic Need satisfaction T3			1.00***	.52***	.59***	.86***	-.54***	-.60***	-.89***	.49***	.60***	.83***
4. Basic Need satisfaction T1				1.00***	.66***	.61***	-.43***	-.31***	-.33***	.62***	.42***	.41***
5. Basic Need satisfaction T2					1.00***	.64***	-.32***	-.46***	-.40***	.41***	.67***	.47***
6. Basic Need satisfaction T3						1.00***	-.38***	-.38***	-.54***	.44***	.49***	.67***
7. Basic Need Frustration T1							1.00***	.55***	.55***	-.73***	-.45***	-.44***
8. Basic Need Frustration T2								1.00***	.65***	-.44***	-.76***	-.53***
9. Basic Need Frustration T3									1.00***	-.42***	-.56***	-.78***
10. Composite Autonomy Satisfaction T1										1.00***	.53***	.52***
11. Composite Autonomy Satisfaction T2											1.00***	.66***
12. Composite Autonomy Satisfaction T3												1.00***
M	4.26	4.29	4.35	4.34	4.34	4.40	2.81	2.76	2.70	4.05	4.07	4.12
SD	0.73	0.76	0.76	0.80	0.84	0.81	0.93	0.93	0.92	0.93	0.95	0.96

Note: Significance effects of correlations coefficients were marked with: †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 2. 1: Descriptives and Inter-Correlations Between All Study Variables in the UK

	13	14	15	16	17	18	19	20	21	22	23	24
<i>UK participants</i>												
1. Total Basic Need satisfaction T1	.80***	.48***	.46***	.81***	.56***	.56***	.58***	.52***	.51***	-.73***	-.55***	-.54***
2. Total Basic Need satisfaction T2	.51***	.80***	.53***	.52***	.82***	.58***	.49***	.58***	.53***	-.59***	-.74***	-.58***
3. Total Basic Need satisfaction T3	.48***	.50***	.79***	.53***	.58***	.84***	.45***	.47***	.55***	-.57***	-.55***	-.74***
4. Basic Need satisfaction T1	.68***	.44***	.41***	.68***	.51***	.47***	.53***	.55***	.46***	-.55***	-.44***	-.40***
5. Basic Need satisfaction T2	.46***	.71***	.46***	.50***	.69***	.51***	.48***	.58***	.49***	-.51***	-.62***	-.50***
6. Basic Need satisfaction T3	.45***	.41***	.68***	.50***	.52***	.76***	.45***	.50***	.54***	-.50***	-.47***	-.63***
7. Basic Need Frustration T1	-.67***	-.38***	-.40***	-.69***	-.44***	-.49***	-.44***	-.35***	-.42***	.67***	.49***	.52***
8. Basic Need Frustration T2	-.41***	-.67***	-.45***	-.39***	-.71***	-.49***	-.37***	-.41***	-.44***	.51***	.64***	.51***
9. Basic Need Frustration T3	-.40***	-.46***	-.70***	-.45***	-.50***	-.71***	-.35***	-.33***	-.44***	.51***	.50***	.66***
10. Composite Autonomy Satisfaction T1	.46***	.29***	.27***	.47***	.41***	.40***	.48***	.42***	.39***	-.53***	-.43***	-.42***
11. Composite Autonomy Satisfaction T2	.33***	.51***	.36***	.37***	.55***	.45***	.40***	.47***	.44***	-.45***	-.61***	-.47***
12. Composite Autonomy Satisfaction T3	.29***	.34***	.46***	.39***	.42***	.55***	.36***	.38***	.44***	-.41***	-.42***	-.57***
13. Composite Competence Satisfaction T1	1.00***	.55***	.53***	.47***	.37***	.38***	.40***	.36***	.39***	-.56***	-.41***	-.42***
14. Composite Competence Satisfaction T2		1.00***	.54***	.33***	.49***	.37***	.34***	.41***	.35***	-.47***	-.54***	-.44***
15. Composite Competence Satisfaction T3			1.00***	.35***	.41***	.50***	.31***	.29***	.39***	-.45***	-.41***	-.58***
16. Composite Relatedness Satisfaction T1				1.00***	.58***	.57***	.51***	.49***	.46***	-.66***	-.49***	-.47***
17. Composite Relatedness Satisfaction T2					1.00***	.61***	.48***	.55***	.52***	-.55***	-.67***	-.54***
18. Composite Relatedness Satisfaction T3						1.00***	.44***	.48***	.53***	-.54***	-.53***	-.67***
19. Life satisfaction T1							1.00***	.68***	.62***	-.57***	-.50***	-.45***
20. Life satisfaction T2								1.00***	.66***	-.50***	-.60***	-.48***
21. Life satisfaction T3									1.00***	-.48***	-.52***	-.57***
22. Depressive Symptoms T1										1.00***	.68***	.68***
23. Depressive Symptoms T2											1.00***	.67***
24. Depressive Symptoms T3												1.00***
25. Panas Positive Affect T1												
M	4.24	4.25	4.35	4.50	4.55	4.58	4.10	4.12	4.14	.71	.65	.62
SD	0.89	0.90	0.88	0.91	0.91	0.93	1.03	1.05	1.05	0.52	0.52	0.48

Note: Significance effects of correlations coefficients were marked with: †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$



Table 2. 1: Descriptives and Inter-Correlations Between All Study Variables in the UK

	25	26	27	28	29	30	31	32	33	34	35	36	37	38
<i>UK participants</i>														
1. Total Basic Need satisfaction T1	.58***	.46***	.46***	-.58***	-.45***	-.50***	.66***	.51***	.53***	-.51***	-.40***	-.40***	-.01	.21***
2. Total Basic Need satisfaction T2	.43***	.58***	.48***	-.50***	-.62***	-.56***	.51***	.68***	.54***	-.43***	-.55***	-.41***	.01	.20***
3. Total Basic Need satisfaction T3	.41***	.44***	.55***	-.47***	-.48***	-.63***	.49***	.53***	.68***	-.46***	-.41***	-.52***	-.02	.22***
4. Basic Need satisfaction T1	.64***	.55***	.49***	-.38***	-.30***	-.33***	.66***	.54***	.51***	-.34***	-.26***	-.25***	.04	.16***
5. Basic Need satisfaction T2	.50***	.68***	.54***	-.33***	-.40***	-.38***	.53***	.70***	.55***	-.32***	-.42***	-.29***	.05	.14**
6. Basic Need satisfaction T3	.48***	.49***	.63***	-.33***	-.30***	-.45***	.51***	.56***	.70***	-.33***	-.30***	-.38***	.02	.16***
7. Basic Need Frustration T1	-.36***	-.26***	-.32***	.59***	.46***	.53***	-.48***	-.35***	-.41***	.50***	.41***	.43***	.04	-.19***
8. Basic Need Frustration T2	-.25***	-.32***	-.31***	.51***	.65***	.58***	-.35***	-.48***	-.40***	.41***	.52***	.41***	.03	-.20***
9. Basic Need Frustration T3	-.25***	-.29***	-.36***	.49***	.53***	.64***	-.36***	-.38***	-.50***	.46***	.41***	.52***	.05	-.23***
10. Composite Autonomy Satisfaction T1	.41***	.29***	.32***	-.43***	-.36***	-.40***	.52***	.38***	.40***	-.44***	-.36***	-.36***	-.04	.26***
11. Composite Autonomy Satisfaction T2	.30***	.41***	.38***	-.38***	-.53***	-.47***	.39***	.55***	.45***	-.34***	-.48***	-.35***	-.03	.24***
12. Composite Autonomy Satisfaction T3	.28***	.31***	.40***	-.38***	-.39***	-.52***	.37***	.41***	.52***	-.38***	-.35***	-.42***	-.03	.29***
13. Composite Competence Satisfaction T1	.55***	.44***	.43***	-.48***	-.38***	-.39***	.55***	.43***	.45***	-.36***	-.29***	-.30***	-.02	.14***
14. Composite Competence Satisfaction T2	.42***	.55***	.42***	-.43***	-.50***	-.43***	.44***	.57***	.43***	-.36***	-.45***	-.30***	.01	.12**
15. Composite Competence Satisfaction T3	.39***	.40***	.50***	-.41***	-.40***	-.52***	.41***	.42***	.57***	-.34***	-.29***	-.40***	-.06	.11*
16. Composite Relatedness Satisfaction T1	.43***	.41***	.38***	-.48***	-.37***	-.43***	.53***	.43***	.43***	-.42***	-.32***	-.31***	.05	.11***
17. Composite Relatedness Satisfaction T2	.35***	.46***	.39***	-.41***	-.51***	-.48***	.43***	.57***	.46***	-.36***	-.44***	-.35***	.05	.13**
18. Composite Relatedness Satisfaction T3	.33***	.38***	.47***	-.38***	-.40***	-.51***	.42***	.47***	.58***	-.39***	-.37***	-.45***	.05	.14**
19. Life satisfaction T1	.42***	.37***	.35***	-.38***	-.36***	-.39***	.51***	.41***	.40***	-.33***	-.29***	-.27***	.06*	.10**
20. Life satisfaction T2	.39***	.45***	.42***	-.32***	-.37***	-.38***	.44***	.53***	.43***	-.28***	-.33***	-.23***	.10*	.08†
21. Life satisfaction T3	.33***	.37***	.40***	-.36***	-.34***	-.43***	.42***	.45***	.52***	-.29***	-.31***	-.33***	.06	.10*
22. Depressive Symptoms T1	-.51***	-.45***	-.46***	.67***	.50***	.58***	-.65***	-.51***	-.54***	.60***	.48***	.49***	.02	-.19***
23. Depressive Symptoms T2	-.36***	-.51***	-.45***	.48***	.63***	.55***	-.45***	-.65***	-.51***	.45***	.58***	.42***	.01	-.15***
24. Depressive Symptoms T3	-.35***	-.39***	-.56***	.49***	.48***	.68***	-.48***	-.50***	-.68***	.46***	.42***	.55***	.02	-.15***
25. Panas Positive Affect T1	1.00***	.65***	.63***	-.31***	-.24***	-.27***	.72***	.56***	.56***	-.34***	-.25***	-.25***	.04	.19***

Note: Significance effects of correlations coefficients were marked with: †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 2. 1: Descriptives and Inter-Correlations Between All Study Variables in the UK

	25	26	27	28	29	30	31	32	33	34	35	36	37	38
<i>UK participants</i>														
26. Panas Positive Affect T2		1.00***	.64***	-.30***	-.30***	-.25***	.60***	.76***	.56***	-.33***	-.34***	-.27***	.04	.14***
27. Panas Positive Affect T3			1.00***	-.30***	-.26***	-.32***	.59***	.61***	.77***	-.30***	-.26***	-.32***	-.02	.19***
28. Panas Negative Affect T1				1.00***	.65***	.67***	-.43***	-.35***	-.35***	.48***	.41***	.38***	.09**	-.22***
29. Panas Negative Affect T2					1.00***	.70***	-.32***	-.42***	-.34***	.38***	.49***	.36***	.12**	-.19***
30. Panas Negative Affect T3						1.00***	-.38***	-.34***	-.45***	.48***	.43***	.49***	.10*	-.21***
31. Vitality T1							1.00***	.69***	.67***	-.50***	-.38***	-.37***	.01	.16***
32. Vitality T2								1.00***	.71***	-.40***	-.51***	-.38***	.00	.12**
33. Vitality T3									1.00***	-.42***	-.38***	-.50***	.01	.15***
34. General Health T1										1.00***	.61***	.61***	.13***	-.17***
35. General Health T2											1.00***	.60***	.18***	-.13**
36. General Health T3												1.00***	.11**	-.14***
37. Gender													1.00***	-.13***
38. Age T1														1.00***
M	3.59	3.52	3.53	2.14	2.10	2.05	4.30	4.21	4.24	2.01	1.99	2.05		44.68
SD	0.61	0.62	0.62	0.65	0.62	0.62	1.25	1.31	1.26	0.74	0.71	0.74		13.98

Note: Significance effects of correlations coefficients were marked with: †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 2. 2: Descriptives and Inter-Correlations Between All Study Variables in Chile

	1	2	3	4	5	6	7	8	9	10	11	12
<i>CH participants</i>												
1. Total Basic Need satisfaction T1	1.00***	.62***	.62***	.79***	.41***	.57***	-.86***	-.59***	-.49***	.82***	.49***	.56***
2. Total Basic Need satisfaction T2		1.00***	.60***	.64***	.80***	.55***	-.43***	-.83***	-.39***	.54***	.82***	.53***
3. Total Basic Need satisfaction T3			1.00***	.55***	.50***	.85***	-.50***	-.47***	-.84***	.51***	.51***	.90***
4. Basic Need satisfaction T1				1.00***	.58***	.63***	-.37***	-.46***	-.30**	.63***	.44***	.49***
5. Basic Need satisfaction T2					1.00***	.62***	-.16†	-.33***	-.14	.39***	.62***	.45***
6. Basic Need satisfaction T3						1.00***	-.35***	-.28*	-.44***	.47***	.44***	.75***
7. Basic Need Frustration T1							1.00***	.53***	.50***	-.72***	-.38***	-
8. Basic Need Frustration T2								1.00***	.49***	-.48***	-.71***	-.45***
9. Basic Need Frustration T3									1.00***	-.38***	-.36**	-.41***
10. Composite Autonomy Satisfaction T1										1.00***	.53***	.79***
11. Composite Autonomy Satisfaction T2											1.00***	.51***
12. Composite Autonomy Satisfaction T3												.52***
M	4.39	4.57	4.57	4.60	4.63	4.63	2.82	2.48	2.49	4.26	4.48	4.42
SD	0.69	0.60	0.75	0.75	0.72	0.90	0.91	0.76	0.87	0.85	0.77	0.92

Note: Significance effects of correlations coefficients were marked with: †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 2. 2: Descriptives and Inter-Correlations Between All Study Variables in Chile

	13	14	15	16	17	18	19	20	21	22	23	24
<i>CH participants</i>												
1. Total Basic Need satisfaction T1	.87***	.48***	.58***	.79***	.56***	.48***	.51***	.34***	.53***	-.67***	-.36***	-.53***
2. Total Basic Need satisfaction T2	.56***	.81***	.43***	.37***	.84***	.51***	.42***	.45***	.43***	-.42***	-.55***	-.32**
3. Total Basic Need satisfaction T3	.61***	.47***	.89***	.34***	.49***	.80***	.49***	.29*	.63***	-.52***	-.31**	-.72***
4. Basic Need satisfaction T1	.71***	.54***	.44***	.61***	.59***	.49***	.53***	.36***	.50***	-.56***	-.31***	-.44***
5. Basic Need satisfaction T2	.37***	.68***	.29*	.22*	.68***	.50***	.31**	.34***	.29*	-.23*	-.40***	-.19
6. Basic Need satisfaction T3	.54***	.43***	.75***	.31**	.49***	.72***	.50***	.19†	.58***	-.39***	-.17	-.57***
7. Basic Need Frustration T1	-.73***	-.30**	-.51***	-.68***	-.37***	-.32**	-.34***	-.22*	-.39***	.55***	.30**	.44***
8. Basic Need Frustration T2	-.55***	-.64***	-.42***	-.39***	-.69***	-.34**	-.37***	-.39***	-.41***	.45***	.49***	.34**
9. Basic Need Frustration T3	-.49***	-.32**	-.75***	-.27**	-.27*	-.63***	-.33***	-.27*	-.49***	.49***	.33**	.66***
10. Composite Autonomy Satisfaction T1	.60***	.38***	.42***	.42***	.41***	.37***	.37***	.20*	.41***	-.47***	-.29**	-.35***
11. Composite Autonomy Satisfaction T2	.37***	.49***	.37**	.25*	.50***	.35**	.36***	.24*	.38***	-.35***	-.46***	-.25*
12. Composite Autonomy Satisfaction T3	.56***	.37**	.75***	.23*	.40***	.56***	.42***	.27*	.56***	-.40***	-.32**	-.63***
13. Composite Competence Satisfaction T1	1.00***	.56***	.62***	.54***	.47***	.40***	.45***	.38***	.44***	-.64***	-.31**	-.52***
14. Composite Competence Satisfaction T2		1.00***	.38***	.21*	.55***	.43***	.31**	.40***	.32**	-.37***	-.39***	-.24*
15. Composite Competence Satisfaction T3			1.00***	.31**	.32**	.53***	.35***	.13	.50***	-.46***	-.10	-.62***
16. Composite Relatedness Satisfaction T1				1.00***	.45***	.36***	.45***	.23*	.40***	-.55***	-.27**	-.38***
17. Composite Relatedness Satisfaction T2					1.00***	.48***	.36***	.47***	.34**	-.31***	-.51***	-.30**
18. Composite Relatedness Satisfaction T3						1.00***	.51***	.31**	.56***	-.48***	-.34**	-.62***
19. Life satisfaction T1							1.00***	.55***	.74***	-.57***	-.23*	-.44***
20. Life satisfaction T2								1.00***	.52***	-.42***	-.52***	-.41***
21. Life satisfaction T3									1.00***	-.58***	-.30**	-.70***
22. Depressive Symptoms T1										1.00***	.50***	.72***
23. Depressive Symptoms T2											1.00***	.52***
24. Depressive Symptoms T3												1.00***
25. Panas Positive Affect T1												
M	4.30	4.53	4.52	4.62	4.71	4.77	4.47	4.66	4.53	.70	.60	.59
SD	0.84	0.68	0.86	0.81	0.77	0.81	0.92	0.82	1.00	0.51	0.47	0.56

Note: Significance effects of correlations coefficients were marked with: †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 2. 2: Descriptives and Inter-Correlations Between All Study Variables in Chile

	25	26	27	28	29	30	31	32	33	34	35	36	37	38
<i>CH participants</i>														
1. Total Basic Need satisfaction T1	.45***	.24*	.53***	-.54***	-.40***	-.47***	.56***	.34***	.56***	-.39***	-.32***	-.41***	.10†	.20**
2. Total Basic Need satisfaction T2	.19*	.45***	.42***	-.46***	-.41***	-.34**	.36***	.51***	.47***	-.26**	-.42***	-.36**	.01	-.05
3. Total Basic Need satisfaction T3	.30**	.33**	.61***	-.44***	-.32**	-.64***	.48***	.30**	.68***	-.37***	-.32**	-.57***	.08	.16
4. Basic Need satisfaction T1	.56***	.37***	.53***	-.32***	-.31***	-.44***	.64***	.45***	.57***	-.28***	-.22*	-.30**	.12*	.08
5. Basic Need satisfaction T2	.24*	.54***	.45***	-.26**	-.20*	-.19	.29**	.51***	.46***	-.18†	-.24*	-.26*	-.03	-.03
6. Basic Need satisfaction T3	.37***	.37***	.64***	-.28**	-.20†	-.45***	.45***	.30**	.66***	-.25*	-.19	-.38***	.07	.13
7. Basic Need Frustration T1	-.23***	-.07	-.38***	.55***	.36***	.35***	-.31***	-.16	-.38***	.36***	.30**	.38***	-.06	-.24***
8. Basic Need Frustration T2	-.08	-.20*	-.24*	.48***	.46***	.36**	-.29**	-.33***	-.31**	.24*	.44***	.33**	-.03	.06
9. Basic Need Frustration T3	-.14	-.13	-.38***	.47***	.33**	.64***	-.35***	-.17	-.49***	.39***	.34**	.58***	-.06	-.15
10. Composite Autonomy Satisfaction T1	.34***	.17†	.41***	-.44***	-.44***	-.39***	.43***	.29**	.40***	-.38***	-.35***	-.37***	.12†	.19**
11. Composite Autonomy Satisfaction T2	.08	.33***	.39***	-.42***	-.38***	-.36**	.28**	.37***	.44***	-.27**	-.37***	-.40***	.02	.05
12. Composite Autonomy Satisfaction T3	.29**	.35**	.52***	-.40***	-.27*	-.64***	.44***	.27*	.61***	-.32***	-.40***	-.51***	.03	.29**
13. Composite Competence Satisfaction T1	.50***	.28**	.52***	-.52***	-.30**	-.45***	.55***	.33***	.53***	-.34***	-.27**	-.40***	.01	.23***
14. Composite Competence Satisfaction T2	.27**	.40***	.36**	-.35***	-.35***	-.20†	.31**	.45***	.33**	-.16	-.33***	-.28*	-.09	-.05
15. Composite Competence Satisfaction T3	.31**	.20†	.58***	-.41***	-.25*	-.53***	.45***	.21†	.58***	-.33***	-.15	-.49***	.10	.20*
16. Composite Relatedness Satisfaction T1	.28***	.11	.33***	-.37***	-.22*	-.26**	.39***	.18†	.39***	-.25***	-.12	-.18†	.13*	.07
17. Composite Relatedness Satisfaction T2	.13	.37***	.29*	-.36***	-.28**	-.26*	.29**	.45***	.37***	-.21*	-.33***	-.20†	.07	-.13
18. Composite Relatedness Satisfaction T3	.18†	.25*	.47***	-.34***	-.29*	-.49***	.34***	.26*	.57***	-.31**	-.23*	-.47***	.07	-.09
19. Life satisfaction T1	.37***	.04	.27**	-.32***	-.13	-.41***	.49***	.15	.49***	-.29***	-.12	-.35***	.17**	.04
20. Life satisfaction T2	.11	.21*	.00	-.23*	-.18†	-.32**	.29**	.39***	.29*	-.25*	-.27**	-.28*	.16	-.12
21. Life satisfaction T3	.27**	.21†	.49***	-.28**	-.31**	-.54***	.53***	.28*	.69***	-.28**	-.15	-.43***	.16	.04
22. Depressive Symptoms T1	-.46***	-.24*	-.49***	.55***	.36***	.53***	-.66***	-.36***	-.60***	.46***	.28**	.52***	.00	-.04
23. Depressive Symptoms T2	-.03	-.44***	-.17	.36***	.45***	.35**	-.25**	-.60***	-.36**	.29**	.61***	.33**	.02	.15
24. Depressive Symptoms T3	-.28**	-.36**	-.57***	.46***	.31**	.68***	-.58***	-.39***	-.73***	.36***	.32**	.55***	-.02	.00
25. Panas Positive Affect T1	1.00***	.44***	.48***	-.17**	-.10	-.23*	.60***	.31**	.47***	-.17**	.04	-.20*	-.04	.08

Note: Significance effects of correlations coefficients were marked with: †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$

Table 2. 2: Descriptives and Inter-Correlations Between All Study Variables in Chile

	25	26	27	28	29	30	31	32	33	34	35	36	37	38
<i>CH participants</i>														
26. Panas Positive Affect T2		1.00** *	.53***	-.29**	-.29**	-.34**	.46***	.65***	.50***	-.27**	-.34***	-.34**	-.09	.06
27. Panas Positive Affect T3			1.00** *	-.34***	-.30**	-.38***	.59***	.41***	.73***	-.34***	-.09	-.48***	.04	.28**
28. Panas Negative Affect T1				1.00** *	.39***	.50***	-.38***	-.35***	-.36***	.43***	.26**	.39***	.03	-.15*
29. Panas Negative Affect T2					1.00** *	.47***	-.27**	-.45***	-.37***	.30**	.43***	.41***	.04	-.04
30. Panas Negative Affect T3						1.00** *	-.51***	-.27*	-.62***	.40***	.39***	.51***	-.06	-.08
31. Vitality T1							1.00** *	.62***	.75***	-.43***	-.08	-.45***	.02	.07
32. Vitality T2								1.00** *	.57***	-.28**	-.37***	-.34**	-.02	-.09
33. Vitality T3									1.00** *	-.40***	-.18	-.55***	.01	.13
34. General Health T1										1.00** *	.48***	.71***	.11†	-.03
35. General Health T2											1.00** *	.59***	.19†	-.05
36. General Health T3												1.00** *	.22*	-.18†
37. Gender													1.00***	-.09
38. Age T1														1.00***
M	3.66	3.61	3.54	2.32	2.09	2.11	4.88	4.76	4.68	2.20	2.11	2.13		34.81
SD	0.63	0.59	0.63	0.62	0.50	0.59	1.16	1.15	1.32	0.72	0.63	0.66		10.54

Note: Significance effects of correlations coefficients were marked with: †  $p < .10$ , \*  $p < .05$ , \*\*  $p < .01$ , \*\*\*  $p < .001$