HUMANITY SELF-CONSTRUAL AND ECOLOGICAL SELF-CONSTRUAL: THE EFFECTS OF SELF-EXPANSION ON PSYCHOLOGICAL, PROSOCIAL, AND PRO-ENVIRONMENTAL OUTCOMES

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Humanity Self-Construal and Ecological Self-Construal: The Effects of Self-Expansion on Psychological, Prosocial, and Pro-Environmental Outcomes

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CERTIFICATE OF ORIGINALITY

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Abstract

Self-construal is a central concept of self in social and cross-cultural psychology, referring to the specific ways in which individuals define and make sense of the self, others, and the interconnectedness between the two. There are two major types of self-construals: independent self-construal and interdependent self-construal, reflecting a self-representation that is confined to the individual self or expanded to include social others in one's self-view.

However, whether there are only two types of self-construal remains debatable. According to the self-categorization theory, a conceptual extension of the social identity theory, the self can be categorized into different levels of inclusiveness. Along this line of reasoning, the existing models of self-construal have only addressed the lowest two levels of self-categories, namely personal and social, whereas more inclusive self-categories on the humanity and natural levels are largely understudied, signaling an important gap in self-construal research that needs to be filled.

To incorporate humanity and nature into the self-construal framework, I refined the construct of humanity self-construal (HSC) as *an expanded self-representation defined by its connectedness to humankind, as differentiated from other nonhuman entities*. I also proposed the construct of ecological self-construal (ESC) as *an expanded self-representation defined by its connectedness to all entities of nature, including humans*. Four cross-sectional studies were conducted to explore and validate the factor structures of the scales of HSC and ESC, and to examine the nomological network of the two constructs, including their differential effects on well-being, prosociality, and environmentalism.

In Study 1, data from 330 university students were collected in Hong Kong. Results from the exploratory factor analysis showed that HSC and ESC were two distinct constructs. The

distinction between HSC and ESC was validated in Study 2, using confirmatory factor analysis on data from 321 university students in Hong Kong. HSC and ESC showed differential effects in predicting various well-being, prosocial, and pro-environmental indicators, after controlling for human-nature orientations. In Study 3, the factor structures of the HSC-Scale and the ESC-Scale were further validated with a multigroup confirmatory factor analysis of 421 community adults from three distinct groups: environmental affiliates, humanitarian affiliates, and non-affiliates in Hong Kong. Differential incremental predictive utility of HSC and ESC was further demonstrated. Finally, in Study 4, I extended the investigation of HSC and ESC to a global context. Using data from a stratified sample of 12,253 community adults from 35 countries/societies across the globe, the distinction between HSC and ESC was further validated.

In summary, the present research broadens the scope of self-construal investigation from the personal and social levels to humanity and natural levels and addresses a much-needed clarification of the long-standing confusion over the conceptualization and measurements of self-nature relationship. The findings show the differential effects of HSC and ESC on well-being, prosociality, and environmentalism.

Keywords: humanity self-construal, ecological self-construal, well-being, prosociality, environmentalism

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Introduction

Self-construal is a central concept of self-view in social and cross-cultural psychology, referring to the specific ways in which individuals define and make sense of the self, others, and the interconnectedness between the two (Markus & Kitayama, 1991). Although self-categorization theory (Turner, Hogg, Oakes, Reicher, & Wetherell, 1987) posits that self-categories can be innumerable, the existing models of self-construal mainly focus on self-categories up to the social level. The relationships of one's sense of self with humanity and beyond are largely understudied (DeCicco & Stroink, 2007; Harb & Smith, 2008). Drawing upon previous literature on deep ecology (Naess, 1973), self-realization (Adler, 1927/2011), self-actualization (Maslow, 1954), self-transcendence (Maslow, 1971), self-construal (Markus & Kitayama, 1991), and self-categorization (Turner et al., 1987; Turner & Onorato, 1999; Turner & Reynolds, 2012), I refined the construct of humanity self-construal and proposed the construct of ecological self-construal to fill the gap. In the present project, I incorporated humanity and nature into the conception of self and examined the psychological, prosocial, and pro-environmental outcomes of such self-expansion.

Self and Self-Construal

Selfhood, *self-concept*, *identity*, and *self-construal* are some commonly used terms in *self* literature. Though these terms are treated as interchangeable at times, there are notable differences between them. *Selfhood* loosely means "what it means to be human" (Smith, 1978, p. 1054), or narrowly refers to the cognitions, emotions, and behaviors as consequences

of both subjective and objective self-reflection (Hoyle, Kernis, Leary, & Baldwin, 1999). *Self-concept* broadly means "the totality of an individual's thoughts and feelings having reference to himself as an object" (Rosenberg, 1979, p. 7), referring to an internal-generated and self-conscious representation of the self (Hoyle et al., 1999). *Identity* encompasses the personal traits, attributes, social roles, and group memberships that are central to one's self-definition (Ashmore, Deaux, & McLaughlin-Volpe, 2004; Oyserman, Elmore, & Smith, 2012). *Self-construal* refers to a self-representation that defines and makes sense of the self, others, and the interconnectedness between the two (Markus & Kitayama, 1991). As the present project aimed at investigating the sense of self characterized by its connectedness and relationships with humanity and nature, *self-construal* was adopted to ground my investigation.

Self-Construal in Literature

Although social psychologists and sociologists have long proposed the existence of multiple representations of the self (James, 1890) and the notion that the sense of self is constructed from relationships (Cooley, 1902; Mead, 1934), the self is generally portrayed as a bounded, unique, and distinctive entity in the literature (Geertz, 1975). It was not until three decades ago that cultural psychologists started to realize that independence is not the only way to define the self. While an independent view of self is prevalent among people in the West, people in East Asia generally expand their sense of self to include others, with an interdependent view characterized by connectedness and relatedness (Markus & Kitayama, 1991; Triandis, 1989). Such culture-specific independent/interdependent self-views were named *self-construals*, referring to the ways in which individuals define and make sense of the self, the others, and the interconnectedness between the two (Markus & Kitayama, 1991).

Some researchers further divided interdependent self-construal into *relational self* and *collective self*, representing self-expansion in two different aspects (Cross, Bacon, & Morris, 2000; Cross & Madson, 1997; E. S. Kashima & Hardie, 2000). Specifically, *relational self* (E. S. Kashima & Hardie, 2000) or *relational self-construal* (Cross et al., 2000) refers to a self-definition based on one's relationships with close others, such as one's spouse, close friends, and siblings. *Collective self* (E. S. Kashima & Hardie, 2000) or *collective self-construal* (Cross et al., 2000) refers to a self-definition based on one's relationships with the group one affiliates. The resulting tripartite model includes the individual, relational, and collective aspects of self-construals, representing the extent of self-expansion to just oneself, close others, or groups (Cross et al., 2000; Cross & Madson, 1997; E. S. Kashima & Hardie, 2000). This tripartite model and the independent/interdependent model are regarded as the two major categorization frameworks of self-construals in cross-cultural psychological research (Brewer & Gardner, 1996; Cross et al., 2000; Cross, Hardin, & Gercek-Swing, 2011; Y. Kashima et al., 1995; Markus & Kitayama, 1991). A large body of empirical evidence converges to show that self-construal plays an important role in cognition (Flinkenflogel, Novin, Huizinga, & Krabbendam, 2017; Krishna, Zhou, & Zhang, 2008), affect (Moscovitch, Hofmann, & Litz, 2005; Russell, Gould, & Fergus, 2017), and behavior (Holland, Roeder, van Baaren, Brandt, & Hannover, 2004; Howard, Gardner, & Thompson, 2007).

Expansion of the Self: Beyond Relational and Collective Aspects

However, the sense of self may possibly go beyond the relational and collective aspects - at least theoretically. This postulation is based upon the self-categorization theory (SCT; Turner et al., 1987), a conceptual extension of the social identity theory (SIT; Tajfel & Turner, 1979). According to the social identity theory (SIT), people can define themselves along a bipolar spectrum of interaction that is purely intrapersonal at one end and purely

interpersonal at the other end. At the intrapersonal end, people define themselves with a personal identity and use it to separate themselves from others. At the interpersonal end, however, people define themselves with a social identity and use it to connect with ingroup others (Hornsey, 2008; Tajfel & Turner, 1979). Built upon the core concept of SIT that individuals navigate their sense of self between the opposite ends of intrapersonal versus interpersonal interaction, the self-categorization theory (SCT) further focuses on the categorization of self at different levels of inclusiveness, suggesting that people can define themselves across three self-categories on the *personal*, *social*, and *humanity* levels, corresponding to the self-definition as individuals, members of social ingroups, and members of the human race, respectively (Turner et al., 1987). If we use the SCT framework to interpret the existing self-construal models, it appears that both the independent/interdependent and tripartite models have only focused on the lowest two levels of inclusiveness: personal (*independent* or *individual*) and social (*interdependent* or *relational* and *collective*) levels, whereas the highest level – humanity level, is entirely left out (McFarland, Webb, & Brown, 2012).

Humanity Self-Construal. Although expansion of the self is regarded as a fundamental human motivation (Baumeister & Leary, 1995; Brewer, 1991; Friedman, 1983), can people expand their sense of self to include humanity? Early psychological theorists believe that for full human development, expanding the self to include broader humanity is not only possible but necessary. For example, personality psychologist Alfred Adler (1927/2011) suggested that *Gemeinschaftsgefühl*, which means a feeling of "oneness with humanity", is an indicator of mature human nature. Similarly, humanistic psychologist Abraham Maslow (1954) proposed that self-actualization, that is, the fulfillment of

individuals' highest need, is reflected by the concern for all humanity, and a holistic understanding of the interconnectedness between oneself and the human community.

The concept of humanity self has been investigated in several previous studies. The term *humanity self-construal* was first introduced by Harb and Smith (2008), referring to a self-representation defined by "its belonging[ness] to human species as differentiated from other living organisms on the planet (p.183). Grounded in the hierarchical classification of self-categorizations (Turner et al., 1987), Harb and Smith (2008) proposed four levels of inclusiveness of self-representations. The bottom three levels are personal, relational, and collective, whereas the top level is a supra structure termed "humanity". Harb and Smith (2008) argued that humanity is an overarching category which surpasses the features of all lower-level social interactions, including that of personal, relational, and collective. Humanity self-construal was measured with a 5-item subscale of the Sixfold Self-Construal Scale (Harb & Smith, 2008) developed for their research. The instrument captures several key features of self-construal that were based on the seminal article of Markus and Kitayama (1991). One sample item is "I think of myself as connected to all humans". Findings showed that humanity self-construal correlated strongly and positively with universalism (Harb & Smith, 2008), indicating that humanity self-construal is related to a concern for the welfare of all humankind. To date, humanity self-construal (Harb & Smith, 2008) is the first and only attempt to investigate the inclusion of humanity in the framework of self-construal. However, there exists some inconsistencies between the conceptualization and measurement of Harb and Smith's (2008) humanity self-construal. On the one hand, their conceptualization of humanity self-construal emphasizes *belongingness*, implying that the self is inside humanity and being part of humanity, which is seemingly more similar to the concept of identity than that of self-construal. On the other hand, their measurement has shown a clear adherence to

the tradition of self-construal that emphasizes *connectedness* and *relatedness*, implying that the self expands to include humanity as part of the self.

A similar concept *identification with all humanity* was proposed by McFarland et al. (2012), referring to the extent of identification with all humankind as a superordinate ingroup (Reese, Proch, & Finn, 2015). Identification with all humanity reflects the perspective of seeing all humankind as one's family (Monroe, 1998), with indiscriminate concern, empathy, and responsibility towards them (Oliner & Oliner, 1992). McFarland et al. (2012) devised and validated a 9 three-part item Identification With All Humanity (IWAH) Scale (McFarland et al., 2012) to assess individuals' degree of identification with different groups on three levels of abstraction: people in their community, people in their nation, and people all over the world. Across studies, identification with all humanity was found to be predictive of global human rights and humanitarian need, and correlated with closeness with others and equality (McFarland et al., 2012). The IWAH Scale (McFarland et al., 2012) mainly captures an individual's self-definition in terms of social role (e.g. How much do you want to be: a responsible citizen of the world), group membership (e.g. How often do you use the word "we" to refer to the following groups of people? To what degree do you think of the following groups of people as "family"?), and also the traits and characteristics of being a prototypical group member (e.g. How much do you believe in: being loyal to all mankind), rather than focusing on connectedness and interdependence that the present project proposed.

Another attempt to include humanity in one's sense of self was by Leary, Tipsord, and Tate (2008), in their proposed *allo-inclusive identity*. Conceptually, the allo-inclusive identity is more inclusive than the humanity self-construal. It is an all-encompassing construct that tries to incorporate broader categories of people, nature, and even the Universe into the sense of self. A 16-item Allo-Inclusive Identity Scale was developed, using Venn diagrams of

seven pairs of circles with different degree of overlaps to represent one's degree of connectedness with different kinds of people, nonhuman natural things, and the Universe (Leary et al., 2008). Factor analyses showed that the items loaded on two factors, representing the inclusion of people versus the inclusion of nonhuman natural world in the self. The resulting subscales were named *AI-People* and *AI-Natural World* (Leary et al., 2008). At first glance, the AI-People subscale seems to be representative of humanity self-construal. However, on closer inspection, it seems that only three of the eight AI-People items are related to humanity self-construal (e.g. the connection between you and a stranger on a bus), while the other five items indeed measure relational self-construal (e.g. between you and your family) and collective self-construal (e.g. between you and the average American). Thus, the AI-People subscale is better understood as a composite measure of humanity, collective, and relational self-construals.

The present project adopted Harb and Smith's label (2008) *humanity self-construal* but the conceptualization was modified to denote "an expanded self-representation defined by its *connectedness* to humankind, as differentiated from other nonhuman entities". The most distinctive modification I made was changing Harb and Smith's conceptualization of "*belong[ness]* to the human species" (2008, p.183) to my conceptualization of "*connectedness* to humankind". With such change, the conceptualization of the new *humanity self-construal* (HSC) is more in line with the traditional conceptualization of self-construal that emphasizes connectedness rather than belongingness (Markus & Kitayama, 1991). This new *humanity self-construal* can thus capture a distinct concept that humanity is infused into the sense of the self and becomes part of the self, rather than the self belongs to the humanity and becomes part of the humanity that most existing self-humanity constructs refer to.

Ecological Self-Construal. Though Harb and Smith (2008) regarded humanity self-construal as a "universal representation" (p. 193) and McFarland et al. (2012) viewed humanity as the top level of identification, Leary et al. (2008) argued that the sense of self could further expand beyond humanity to include nature and other nonhuman entities.

The notion of such expanded sense of self was documented in Maslow's final work on the hierarchy of needs (Maslow, 1971), in which an additional self-transcendence level was placed on top of the self-actualization level. Self-transcendence denotes the most holistic inclusiveness where the self is interconnected with nature and all lifeforms, enabling the individuals to experience the ultimate meaning of life and a sense of unity of all reality (Koltko-Rivera, 2006; Maslow, 1971). In succinct, self-transcendence can be regarded as Maslow's closing remarks of his renown theory on the hierarchy of needs, signifying a more holistic sense of being beyond the self-actualization level (Koltko-Rivera, 2006). Maslow's view of interconnectedness between the self and nature has also been supported by biologist Edward O. Wilson's (1984) genetic-based theory *biophilia,* which postulates that humans have an innate tendency to feeling close and connected to nature (Kellert & Wilson, 1995).

The term *ecological self* was first articulated by Norwegian philosopher Arne Naess (1987), referring to an expansion of one's sense of self to include all beings through the process of *self-realization,* where the boundaries between the self and others diminish. The concept of *ecological self* is grounded in Naess' philosophical perspective of *deep ecology* (1973), which emphasizes the inherent rights and worth of all beings, and the interconnectedness of humans and nature.

In the past two decades, there has been an increasing number of studies examining the self-nature relationship in the fields of ecology and ecopsychology, accompanied by considerable uncertainty around its terminologies and conceptualizations. Some examples

are, *ecological identity* (Thomashow, 1996), which refers to a sense of self that is construed in relation to the Earth; *environmental identity* (Weigert, 1997), which describes a sense of self that is connected to nature. The same term *environmental identity* is also used by Clayton (2003) but is conceptualized as "a sense of connection to some part of the nonhuman natural environment" (p. 45) and "a belief that the environment is important to us and an important part of who we are" (p. 46). Some call it *environmental self* (Cantrill & Senecah, 2001), representing a sense of self that is partially denoted by its association with the environment. Others call it *inclusion of nature in the self* (Schultz, 2001), referring to the inclusion of the cognitive schema of nature into the self-concept. Some use the term *connectedness to nature* (Mayer & Frantz, 2004) to denote the affective sense of oneness with nature. Besides, the term *nature relatedness* (Nisbet, Zelenski, & Murphy, 2009) is also used to describe an individual's affective, cognitive, and experiential connection to nature.

As reviewed above, broad terms such as *nature*, *environmental*, *ecological* are commonly used to describe such self-nature relationships; however, the scopes of terms are seldom explicitly explained. Intuitively, *nature*, *environmental*, *ecological*, by definition, should encompass all entities of nature, including humans. However, precise elaborations are not always available. The only exception is Clayton's *environmental identity* (2003); however, the definition explicitly excludes humans by emphasizing "nonhuman natural environment" only. Taken together, previous literature either did not fully elaborate on the meaning of *nature*, *environmental*, or *ecological* in their conceptualization of self-nature relationship; or counterintuitively confined the construct to anything-but-human natural entities.

Such imprecision has also been reflected in several widely used self-nature psychometric tools. A few examples can be found in the Environmental Identity (EID) Scale

(Clayton, 2003): “Being a part of the ecosystem is an important part of who I am”; the Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004): “I often feel a sense of oneness with the natural world around me”; and the Nature Relatedness Scale (NR-6; Nisbet & Zelenski, 2013): “My relationship to nature is an important part of who I am.” Previous research has not explicitly elaborated on the scope that *ecosystem*, *natural world*, and *nature* cover. It is not clear whether humans and nonhumans are included in or excluded from these seemingly vague terms.

While earlier work on self-nature relationship tends to be exclusive, recent research favors another extreme that encompasses not only humans and nonhumans, but also the cosmos. One example is the concept of *metapersonal self-construal* proposed by DeCicco and Stroink (2007). Metapersonal self-construal refers to an unusually broad sense of self, defined by the unified interconnectedness with “all things, all life, all of creation” that “extends beyond the individual or personal to encompass wider aspects of humankind, life, psyche, or the cosmos” (p. 84), measured by a 10-item The Metapersonal Self (MPS) Scale (DeCicco & Stroink, 2007). However, some items of the scale seemingly do not adequately reflect the conceptualization of the construct that it claims. For example, in the item: “I see myself as being expanded into everything else”, the term “everything” is too broad to denote natural living things only. “Everything”, nevertheless, is equally relevant to depict an entity of nature (e.g., a coconut tree) or an artificial object (e.g., a pink umbrella). Moreover, although the scale claims to measure self-construal, several items do not appear to be directly related to the concept of self-construal. Items such as “My sense of inner peace is one of the most important things to me” and “I take the time each day to be peaceful and quiet, to empty my mind of everyday thoughts” seem more like measuring the concept of mindfulness rather than self-construal.

Another inclusive construct for the self-nature relationship is *allo-inclusive identity* proposed by Leary and colleagues (2008), denoting an all-encompassing construct including humans, nonhuman living things, and the Universe. As abovementioned, the Allo-Inclusive Identity Scale (Leary et al., 2008) comprises a human subscale (*AI-People*) and a nonhuman subscale (*AI-Natural World*). The natural entities covered in the AI-Natural World Subscale are wide-ranging: a wild animal (such as a squirrel, deer, or wolf), a dog, a tree, an eagle soaring in the sky, all living creatures, the Earth, the moon, and the Universe. However, how and why these specific natural entities are selected and to what extent does each entity represent the natural world have not been explicitly elaborated. Moreover, separating humans and nonhumans into two subscales seemingly reflects a paradoxical assumption that humans, though naturally born, are qualitatively different from other nonhuman natural entities and are thus not considered to be part of the natural world.

To clarify the conceptual confusion and measurement nebulousness of existing self-nature constructs, a new construct termed *ecological self-construal* (ESC) was proposed in the present project to denote a specific type of self-expansion that connects the self to all entities of nature that includes both humans and nonhumans. However, the concept that humans are a kind of natural entity may conflict with people's worldview if they see humans as rulers of nature, stewards of nature, or partners with nature, rather than participants in nature (De Groot, 2012; Kockelkoren, 1993). Therefore, in the initial stage of construct development, I interviewed laypeople to understand how they would interpret the term "all entities of nature". Unsurprisingly, an overwhelming majority of the interviewees could easily include nonhuman natural entities such as wild animals, trees, ocean, and birds in "all entities of nature", while only very few of them would also consider humans as one kind of natural entity. Their responses indicated that the concept that nonhuman living things are part

of nature is well-understood and readily available in their cognitive schema (Axelrod, 1973), implying that it is a pre-existing assumption that does not need any further elaboration. In contrast, the idea that humans are also one kind of natural entity needs to be explicitly emphasized, as such notion does not necessarily align with people's belief system. Therefore, I conceptualized *ecological self-construal* (ESC) as "an expanded self-representation defined by its connectedness to all entities of nature, including humans". By explicitly include humans in the term of "all entities of nature", I aimed to highlight the conceptual distinctiveness of ecological self-construal as differentiate from other existing self-nature constructs, and to confront the knowledge gap in the self-nature literature. Psychometric tools would also be adjusted to better reflect the conceptualization of this new construct.

Relationships Between Humanity Self-Construal, Ecological Self-Construal, and Other Self-Construals

The relationship between humanity self-construal and ecological self-construal is intriguing. Although Turner et al. (1987) only mentioned three levels of abstraction (viz. personal, social, and humanity) in their original proposal of SCT, they nevertheless emphasized that self-categories can be innumerable. In terms of the degree of expansion, ecological self-construal represents a broader expansion of self that incorporates all entities of nature, including humans, than that of humanity self-construal that captures humanity only. Theoretically, to incorporate nature into the SCT framework, nature should be placed at the level of abstraction above that of humanity. The resulting levels of abstraction will thus be in the descending order of natural, humanity, social (*interdependent* or *relational* and *collective*), and personal (*independent* or *individual*). In other words, ecological self-construal can be viewed as a superordinate construct that transcends humanity, collective, relational and individual self-construals. To better understand the relationships between humanity self-

construal (HSC), ecological self-construal (ESC), and other self-construals, and to better fit the two constructs into the existing self-construal literature, a necessary first step is to investigate the properties of HSC and ESC with measurement tools grounded in self-construal methodology.

Correlates and Consequences of Humanity Self-Construal and Ecological Self-Construal

Conceptually, humanity self-construal should be correlated with identification with all humanity, whereas ecological self-construal should be correlated with connectedness to nature, environmental identity, and ecological worldview. Humanity self-construal and ecological self-construal may also be related to human-nature orientations (Braito et al., 2017; Thompson & Barton, 1994), referring to different existential perspectives on the relationships between humans and nature. Three basic human-nature orientations are ecocentrism, anthropocentrism, and environmental apathy (Thompson & Barton, 1994). Specifically, the ecocentric perspective acknowledges nature as the center of the world whereas humans are just part of the nature, the anthropocentric perspective regards humans as having dominion over nature and other nonhuman life, and the environmental apathy perspective simply ignores the relationship between humans and nature. Although the main focus of human-nature orientations is the humans as a whole, whereas the centrality of self-construal is the self, both human-nature orientations and the two self-construals may exert certain effects on individuals, humanity, and the nature altogether. To establish the nomological network of HSC and ESC, one primary objective of this project is to examine the effects of self-expansion on oneself (psychological outcomes), humanity (prosocial outcomes), and the nature (pro-environmental outcomes), with or without accounting for the effects of human-nature orientations.

Psychological Outcomes. Positive mental health refers to a state of well-being characterized by the abilities to actualize one's potential, cope with stress, work productively, and contribute to the community (World Health Organization, 2001). There are three aspects of well-being: emotional, psychological, and social (Westerhof & Keyes, 2010). Emotional well-being, also known as hedonic well-being, focuses on the gratifying experiences of happiness and satisfaction (Diener, 1984; Diener, Suh, Lucas, & Smith, 1999; Keyes, 2005, 2007). Psychological well-being and social well-being are the two components of eudaimonic well-being. Specifically, psychological well-being focuses on the meaningful personal endeavors such as personal growth, purpose in life, and autonomy (Keyes, 2005; Ryff, 1989, 2014), whereas social well-being focuses on the optimal social functioning such as social acceptance, social contribution, and social integration (Keyes, 1998, 2005, 2007). One source of well-being is a broad sense of interconnectedness with something beyond one's own self (Hanley, Baker, & Garland, 2017; Joshanloo & Weijers, 2019; Kyprianides, Easterbrook, & Brown, 2019), which can be obtained through transcending one's sense of self to include larger collectives (Kyprianides et al., 2019).

This expanded sense of self can fulfill an individual's innate need for relatedness (Ryan & Deci, 2000), serving as a "social cure" to negative emotion (Haslam, Jetten, Cruwys, Dingle, & Haslam, 2018; Kyprianides et al., 2019). In addition, an awareness that everything is interconnected and interdependent may also help reduce one's unnecessary comparison with others, which in turn alleviates one's dissatisfaction with life (Joshanloo & Weijers, 2019). This transcended sense of interconnectedness can also provide an individual with a meaningful sense of existence (Delle Fave & Soosai-Nathan, 2014) that life has a grander purpose beyond one's own self (Baumeister, 1991; Frankl, 1963/1985).

Empirical evidence shows that incorporating other people in one's sense of self is positively correlated with life satisfaction and negatively correlated with depression (Leary et al., 2008). A broad sense of self that includes social others is also positively linked to personal growth and the presence of meaning in life (Wayment, Bauer, & Sylaska, 2015). A recent meta-analysis (Pritchard, Richardson, Sheffield, & McEwan, 2020) has also concluded that perceived interconnectedness with nature is positively associated with various indicators of emotional well-being, including positive affect and life satisfaction (Mayer & Frantz, 2004; Mayer, Frantz, Bruehlman-Senecal, & Dolliver, 2009). This sense of nature interconnectedness is also positively correlated with meaning in life, personal growth, and is linked to psychological and social well-being (Howell, Passmore, & Buro, 2013; Trigwell, Francis, & Bagot, 2014).

Following this line of thought, including larger collectives such as humanity and all entities of nature in one's sense of self, as in humanity self-construal and ecological self-construal, may be conducive to well-being. Given that all entities of nature represent a larger and more inclusive collective than the humanity alone, ecological self-construal, as compared with humanity self-construal, may enhance a deeper and broader sense of interconnectedness, and therefore, more predictive of well-being. Therefore, I hypothesized that:

Hypothesis 1a: Both humanity self-construal and ecological self-construal would positively predict well-being.

Hypothesis 1b: Ecological self-construal would be a stronger predictor than humanity self-construal of well-being.

Hypothesis 1c: Both humanity self-construal and ecological self-construal would exhibit incremental predictive power over and above human-nature orientations on well-being.

Prosocial Outcomes. Prosociality encompasses the positive attitude and behavior that benefit other human beings (Padilla-Walker & Carlo, 2015). Prosocial attitude refers to an other-focused orientation characterized by sympathizing for unfortunate others (Davis, 1980), concerning for their welfare, and feeling personally responsible to help (Eisenberg, Fabes, & Spinrad, 2006; Eisenberg & Mussen, 1989); whereas prosocial behavior denotes the actual voluntary actions taken to help or benefit others (Eisenberg et al., 2006; Eisenberg & Mussen, 1989).

The tendency to help is not entirely indiscriminate, depending on one's perception of how needy (Engel, 2011) and deserving (Skitka & Tetlock, 1992) the recipient is, and specifically, how close the recipient is to the individual (Brañas-Garza, Durán, & Espinosa, 2012). That sense of closeness can be derived not only from relationships such as kinship or friendship (Hruschka, 2010) but also from the cognitive reconstruction via self-categorization (Turner et al., 1987). When others are included in one's sense of self and become an indistinguishable part of the self, they will be treated like the self, empathized like the self, and helped like the self (Aron et al., 2004).

This theoretical assumption is supported by empirical evidence that perceived interconnectedness with other people is positively associated with prosocial orientation (Leary et al., 2008), obligation (Oyserman, Sakamoto, & Lauffer, 1998), intention, and actual behavior (Cialdini, Brown, Lewis, Luce, & Neuberg, 1997; Pavey, Greitemeyer, & Sparks, 2011). Similarly, literature in self-construal and prosociality also reveals some positive associations between psychological interdependence and charitable behavior. Participants

primed with interdependent self-construal donated significantly more money to their ingroup members than to their outgroup members, supporting the notion that psychological proximity can enhance prosociality (Duclos & Barasch, 2014). Along with this line of reasoning, endorsing humanity self-construal may be conducive to prosociality. When humanity is merged in one's sense of self, humanity's needs become one's own needs, helping humanity would thus be perceived as helping one's own self.

Another line of literature also shows that perceived interconnectedness with nature is positively correlated with prosocial beliefs and concerns, and willingness to help (Metz, 2017; Nisbet et al., 2009). However, it is noteworthy that the construct *nature relatedness* used in these studies only captures one's sense of connectedness with the nonhuman part of the natural world (Nisbet et al., 2009). In contrast, the ecological self-construal (ESC) proposed in the present project is a much broader and more encompassing construct, denoting an expanded self-representation that includes not just humans *or* nonhumans alone, but both humans *and* nonhumans together.

However, given that both humans and nonhumans are infused with the self in ESC whereas only humans are infused with the self in HSC, the altruistic orientation toward humans may be more focused and dominant in HSC than in ESC. In other words, HSC is likely to be a stronger predictor than ESC of prosociality. Therefore, I hypothesized that:

Hypothesis 2a: Both humanity self-construal and ecological self-construal would positively predict prosocial attitude and behavior.

Hypothesis 2b: Humanity self-construal would be a stronger predictor than ecological self-construal of prosocial attitude and behavior.

Hypothesis 2c: Both humanity self-construal and ecological self-construal would exhibit incremental predictive power over and above human-nature orientations on prosocial attitude and behavior.

Pro-Environmental Outcomes. On the Earth Day 2018, The Weather Channel (2018) reviewed some alarming environmental issues of the year. As reported, nine million tons of plastic leaked into the oceans annually and the figure was projected to double by 2030. Sea level was rising at an unprecedented rate, which might change the landscape faster than expected. Grasslands were declining, animals were endangered, water supply were jeopardized. Extreme weather would become the greatest threat to all in the coming decade. In the face of a global environmental crisis, how would people with a humanity self-construal (HSC) react differently from those with an ecological self-construal (ESC)?

According to my conceptualization, those who endorse humanity self-construal would experience the world from a humanity perspective and view the environmental impacts on humans as directly on themselves. Therefore, when these individuals read the striking article by The Weather Channel (2018), they are likely to attend to the aversive consequences for humans. For example, they may be concerned about how humans' health will be affected by the plastics in the ocean that go up the food chain, how people are forced to displace due to the rising sea levels, and how people will suffer from shortages of food and water due to the extreme weather. These human-based environmental concerns may translate into pro-environmental attitudes and behaviors. Empirical studies also support that perceived connectedness with all humanity positively correlates with concern for global warming (Buchan et al., 2011), and predicts pro-environmental behavior (Leung, Koh, & Tam, 2015).

In contrast, those who endorse ecological self-construal would include the broader perspectives of nature in their own perspective. Therefore, besides attending to the aversive

environmental impacts on humans, they would also attend to the negative environmental consequences on other nonhuman entities. It is possible that when these people read the same environmental article, they may have additional concerns about how marine life will be threatened, how plant and animal species will face extinction, and how ecosystems will be disrupted and destroyed. As when all entities of nature are infused in one's sense of self, harms to the nature will be experienced as harms to oneself (Roszak, 1995). These additional empathic concerns toward the nature may translate into additional pro-environmental attitudes and behaviors.

However, the investigation of the effects of self-construal on environmental protection is scant. One exception is the study by Arnocky, Stroink, and DeCicco (2007) that examined the differentiation between independent, interdependent, and metapersonal self-construals on predicting pro-environmental attitudes and behaviors. Their findings demonstrated that independent self-construal predicted egoistic environmental concern and competitive resource sharing; interdependent self-construal predicted cooperative resource sharing; while metapersonal self-construal, a sense of self that unites everything including the cosmos, uniquely predicted biospheric environmental concern, ecological cooperation, and conservation behavior. Their findings revealed a pattern that the more inclusive the self-construal, the more extensive the scope of the pro-environmental attitudes and behaviors. In view of the study of Arnocky et al. (2007) only focused on independent, interdependent, and metapersonal self-construals, and the inconsistency of the conceptualization and measure of metapersonal self-construal (MPS; DeCicco & Stroink, 2007), the focus of the present project on humanity and ecological self-construals will be able to close this knowledge gap by further investigating the impacts of self-construal on pro-environmental attitudes and behaviors.

Taken together, I expected that both humanity self-construal and ecological self-construal would positively predict pro-environmental attitude and behavior. However, as all environmental issues are directly related to nature as a whole whereas only part of them have direct impacts on humans, ecological self-construal would be a stronger predictor than humanity self-construal of pro-environmental attitude and behavior. Therefore, I hypothesized that:

Hypothesis 3a: Both humanity self-construal and ecological self-construal would positively predict pro-environmental attitude and behavior.

Hypothesis 3b: Ecological self-construal would be a stronger predictor than humanity self-construal of pro-environmental attitude and behavior.

Hypothesis 3c: Both humanity self-construal and ecological self-construal would exhibit incremental predictive power over and above human-nature orientations on pro-environmental attitude and behavior.

Overview

The objective of the proposed project is threefold: 1) To refine the construct of humanity self-construal and propose the construct of ecological self-construal, so as to incorporate humanity and nature into the conception of the self. 2) To explore and validate the new measures of humanity self-construal and ecological self-construal and to establish their construct validity. 3) To examine the psychological, prosocial, and pro-environmental outcomes of humanity self-construal and ecological self-construal.

Four cross-sectional studies were conducted to validate the new measures of humanity self-construal and ecological self-construal, and examine their nomological networks, convergent validity, and discriminant validity. I expected both humanity self-construal and

ecological self-construal would positively predict well-being, prosocial attitude and behavior, and pro-environmental attitude and behavior, over and above human-nature orientations. I also expected that ecological self-construal would be a stronger predictor of well-being and environmentalism, whereas humanity self-construal would be a stronger predictor of prosociality.

The Present Research

The first two studies aimed at establishing the construct validity of Humanity Self-Construal Scale (HSC-Scale) and Ecological Self-Construal Scale (ESC-Scale). In Study 1, I developed the two scales and explored their factor structures among Hong Kong local university students (n = 330). I also examined the correlates of humanity self-construal (HSC) and ecological self-construal (ESC) with connectedness to nature, environmental identity, ecological worldview, three aspects of self-construals (individual, relational, and collective), and three levels of identification (community, society, and all humanity), and tested the discriminant validity and convergent validity of the two constructs. Study 2 validated the factor structures of the two scales with another sample of university students (n = 321) in Hong Kong, compared the predictive power of the two constructs, and tested their incremental predictive utility in well-being, prosocial attitude and behavioral intention, and pro-environmental attitude and behavioral intention. In Study 3, I extended the investigations of the two scales beyond student samples to a broader context of general population, and beyond attitudes and behavioral intentions to behaviors of prosociality and environmentalism. The sample comprised 421 Hong Kong community adults, including affiliates of environmental groups (n = 117), affiliates of humanitarian groups (n = 110), and non-affiliates of either group (n = 194). The factorial validity of the two scales was tested across the three groups, group differences of HSC, ESC, and other measures were compared, and the effects of the two constructs on well-being, prosocial behaviors, pro-environmental behaviors, and carbon emission were also examined. Finally, Study 4 aimed to further investigate the validity of the Humanity Self-Construal Scale (HSC-Scale) and Ecological Self-Construal Scale (ESC-Scale) in a global context. Data from 12,253 participants across 35 countries/societies were collected and analyzed to validate the factor structure of the two scales.

The analytic strategies varied across the four studies. Specifically, I used exploratory factor analysis (EFA) to identify the factor structures of Humanity Self-Construal Scale (HSC-Scale) and Ecological Self-Construal Scale (ESC-Scale) in Study 1, and confirmatory factor analysis (CFA) for scale validation in Study 2. In Studies 1 and 2, I adopted correlation analysis to test the discriminant and convergent validity of HSC and ESC. In Studies 2 and 3, I used hierarchical regression analysis to demonstrate the predictive power and incremental predictive utility of HSC and ESC toward various well-being, prosocial, and pro-environmental variables, and chi square difference test to investigate the differential regression weights between the two constructs. In Study 3, I used analysis of covariance (ANCOVA) to examine the differences of HSC, ESC, and other measures among three local groups. In Studies 3 and 4, I adopted multiple group confirmatory factor analysis (MGCFA) to further examine the factor structures of the two scales across three groups in the local context, and 35 countries/societies in the global context, respectively.

Study 1: Exploring the Factor Structures of Humanity Self-Construal Scale and Ecological Self-Construal Scale among Local University Students

In Study 1, I developed the scales for humanity self-construal (HSC) and ecological self-construal (ESC) and identified the factor structures of the two scales. University students were sampled as the sense of self is particularly important in this transitional stage between late adolescence and young adulthood, when individuals are compelled to examine the big question of who they are in this developmental milestone (Montgomery & Côté, 2003; Reich, Harber, & Siegel, 2008). To establish the discriminant validity of HSC and ESC, both HSC and ESC items were pooled and tested in the same exploratory factor analysis (EFA). The convergent validity of HSC and ESC was tested by examining their correlates with constructs which were conceptually similar to either of them.

Method

Participants and Procedure

A total of 330 Hong Kong local university students (203 females; *M*age = 19.45, *SD* = 1.54, age range 18-28) were openly recruited to participate in an online survey through mass emailing. Participants came from diverse academic disciplines: arts & humanities (13.3%), business (32.7%), education (3.3%), engineering (9.1%), health & medicine (11.2%), law (1.2%), science (13.3%), social science (14.8%), and others (0.9%). The data were collected between the period of November to December 2018. The sample size of the present study was considered appropriate for exploratory factor analysis, given that it exceeded the minimum absolute sample size of 300 (Tabachnick & Fidell, 2013) and the minimum relative sample size of 100 calculated by the ratio of 10 participants to 1 item (Nunnally, 1978). Inclusion criteria for participation were permanent residency of Hong Kong and ability to read and write traditional Chinese characters. For all studies reported in this thesis, informed

consent was obtained and confidentiality was assured at the beginning of the survey. Demographic information, such as age and gender, was collected at the end of the survey.

For Studies 1 to 3, the questionnaires were administered in traditional Chinese characters. For the measures that do not have an extant Chinese version, standard translation, back-translation, and verification were conducted to ensure the equivalence of meanings between the two language versions (Brislin, 1986).

Measures

Humanity Self-Construal. Humanity self-construal (HSC) was measured by 10 items developed for the present study. By adapting and modifying items from existing self and self-construal scales, the HSC items explicitly emphasize the expansion of the sense of self to encompass all humanity. Adaptation was drawn from the Sixfold Self-Construal Scale (Harb & Smith, 2008), Relational, Individual, and Collective self-aspects Scale (RIC Scale; E. S. Kashima & Hardie, 2000), Brief Relational, Individual, and Collective self-aspects Scale (Brief RIC Scale; Hardie, 2009), Self-Construal Scale (SCS; Singelis, 1994), Nature Relatedness Scale (NR-6: Nisbet & Zelenski, 2013), and Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004). The 10 items were selected based upon their ability to reflect the characteristics of self-construal in terms of connectedness and relationship, and to remain conceptually meaningful across humanity self-construal and ecological self-construal, as they would be adapted in both Humanity Self-Construal Scale and Ecological Self-Construal Scale (See Table 1). Participants were asked to rate the extent to which they agree or disagree with each statement on a 7-point Likert scale, ranging from 1 (*strongly disagree*) to 7 (*strongly agree*). A sample item was “My relationship to all humanity, is an important part of who I am”.

Ecological Self-Construal. Ecological self-construal (ESC) was measured by 10 items, using the same item structure and the same 7-point Likert scale as that of the HSC-Scale, with the phrase "all humanity" substituted by "all entities of nature, including humans" in each statement. A sample item was "My relationship to all entities of nature, including humans, is an important part of who I am".

Connectedness to Nature. The 14-item Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004) was used to measure individuals' experiential sense of connectedness to nature. Participants were asked to rate the extent to which they agreed or disagreed with each statement on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A sample item was "I often feel a sense of oneness with the natural world around me". The reliability of this scale was acceptable, with Cronbach's alpha of .78.

Environmental Identity. The 4-item Environmental Identity subscale of the Environmental Identity Scale (EID; Clayton, 2003) was used to measure individuals' sense of self-identification as members of the environmental collective. Participants were asked to indicate the extent to which each statement describes them on a 7-point Likert scale, ranging from 1 (*not at all true of me*) to 7 (*completely true of me*). A sample item was "I think of myself as a part of nature, not separate from it". The subscale had good reliability, with Cronbach's alpha of .86.

Ecological Worldview. The 15-item New Ecological Paradigm (NEP) Scale (Dunlap, Van Liere, Mertig, & Jones, 2000) was used to measure individuals' cognitive belief about nature and humans' role in it. Participants were instructed to indicate the extent to which they agreed or disagreed with each statement on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). A sample item was "The balance of nature is very delicate

and easily upset". The scale had acceptable internal consistency, with Cronbach's alpha of .79.

Individual Self, Relational Self, and Collective Self. The Relational, Individual, and Collective self-aspects Scale (RIC Scale; E. S. Kashima & Hardie, 2000) was used to measure the relative importance of the individual, relational, and collective aspects of self-construals with 10 three-part items. For each item, participants were presented with a sentence stem and three sentence completions that represented individual, relational, and collective responses, respectively. Participants were asked to rate the extent to which each statement (a sentence stem combined with a response) describes them on a 7-point Likert scale, ranging from 1 (*not at all true of me*) to 7 (*completely true of me*). A sample item was "I think it is most important in life to": "have personal integrity/be true to myself" (individual aspect); "have good personal relationships with people who are important to me" (relational aspect); and "work for causes to improve the well-being of my group" (collective aspect). All three measures had acceptable reliability, with Cronbach's alphas of .74, .76, and .80, for the individual, relational, and collective parts, respectively.

Identification with Community, Society, and All Humanity. The Identification With All Humanity Scale (IWAH; McFarland et al., 2012) was adapted to measure the degree to which individuals identify themselves with community, society, and all humanity, measured with 9 three-part items on a 5-point Likert scale. A sample item was "How much would you say you have in common with the following groups? a. People in my community (identification with community); b. Hong Kong people (identification with society); c. People all over the world" (identification with all humanity). All three measures had good reliability, with Cronbach's alphas of .91, .86, and .86, for the community, society, and all humanity parts, respectively.

Results and Discussion

An exploratory factor analysis (EFA) was conducted to differentiate the two constructs of the expanded self-construal. Parallel analysis suggested a two-factor solution. To ensure a strong association between the items extracted and their underlying factors, items with factor loadings lower than .6 were dropped. As a result, 13 items were retained (see Table 2). Factor one, which comprised seven ecological items and explained 50.26% of the total variance, was labeled *ecological self-construal (ESC)*. Factor two, which comprised six humanity items and explained 11.93% of the total variance, was labeled *humanity self-construal (HSC)*. Among the six HSC items, three items shared the same structure with three ESC items. The first pair, "I feel I have a strong relationship with all humanity" (HSC item) and "I feel I have a strong relationship with all entities of nature, including humans" (ESC item), was adapted from the Sixfold Self-Construal Scale (Harb & Smith, 2008). The second pair, "My relationship to all humanity is an important part of who I am" (HSC item) and "My relationship to all entities of nature, including humans, is an important part of who I am" (ESC item); and the third pair "I feel very connected to all humanity" (HSC item) and "I feel very connected to all entities of nature, including humans" (ESC item), were adapted from the Nature Relatedness Scale (NR-6; Nisbet & Zelenski, 2013). The remaining three HSC items were adapted from the Relational, Individual, and Collective self-aspects Scale (RIC Scale; E. S. Kashima & Hardie, 2000), Self-Construal Scale (SCS; Singelis, 1994), and Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004). For ecological self-construal, the remaining four items were adapted from the Sixfold Self-Construal Scale (Harb & Smith, 2008), Relational, Individual, and Collective self-aspects Scale (RIC Scale; E. S. Kashima & Hardie, 2000), Brief Relational, Individual, and Collective self-aspects Scale (Brief RIC Scale; Hardie, 2009), and Self-Construal Scale (SCS; Singelis, 1994). Both the HSC-Scale and ESC-Scale had good reliability, with Cronbach's alphas of .86 and .91, respectively. All

item-total correlations for each scale were positive and greater than the cutoff point of .4 (Gliem & Gliem, 2003), which further supported the internal construct validity of each scale.

Descriptive statistics and bivariate correlations of the measures are presented in Table 3. The correlation between HSC and ESC was significant, $r = .62$, $p < .01$, indicating a strong and positive correlation between the two constructs. HSC significantly, strongly, and positively correlated with identification with all humanity ($r = .61$, $p < .01$), a conceptually similar humanity construct. Its relationships with identification with society ($r = .42$, $p < .01$) and identification with community ($r = .36$, $p < .01$) were moderate and positive. Similarly, the relationships between HSC and the three less inclusive self-construals, i.e., individual self ($r = .28$, $p < .01$), relational self ($r = .35$, $p < .01$), and collective self ($r = .44$, $p < .01$), were also moderate and positive. Additionally, HSC strongly and positively correlated with two ecological constructs, i.e., connectedness to nature ($r = .48$, $p < .01$) and environmental identity ($r = .51$, $p < .01$).

ESC significantly, very strongly, and positively correlated with conceptually similar ecological constructs, including connectedness to nature ($r = .75$, $p < .01$) and environmental identity ($r = .68$, $p < .01$). ESC also significantly and positively correlated with other less inclusive self-construals, though to a lesser extent. Specifically, ESC moderately correlated with individual self ($r = .29$, $p < .01$), relational self ($r = .34$, $p < .01$), and collective self ($r = .37$, $< .01$), indicating that the more inclusive the self-construal, the stronger its correlation with ESC. Similarly, the relationships between ESC and the three levels of identification were also positive and significant. Specifically, ESC weakly correlated with identification with community ($r = .17$, $p < .01$), moderately correlated with identification with society ($r = .29$, $p < .01$), and strongly correlated with identification with all humanity ($r = .49$, $p < .01$). Likewise, the more inclusive the identification, the stronger its correlation with ESC.

To demonstrate the differentiability of HSC and ESC, I further tested the relationships of the two constructs with New Ecological Paradigm (NEP), an ecological worldview. As expected, ESC significantly and positively associated with NEP ($r = .37$, $p < .01$), whereas the relationship between HSC and NEP was not significant ($p > .05$).

Results Summary

The factor structure of HSC-Scale and ESC-Scale was explored, with seven ESC items strongly loaded on the ESC construct and six HSC items strongly loaded on the HSC construct. Consistent with my conceptualization, HSC, which represents the expansion of self-construal on the humanity level, was most strongly related to the humanity construct of identification with all humanity. ESC, which captures the expansion of self-construal on the natural level, was most strongly related to environmental constructs including connectedness to nature and environmental identity. These findings support the convergent validity of each construct. Although the findings of correlation analysis revealed that HSC and ESC were similar in many ways, the discriminant validity of the two constructs was supported by the differentiability of HSC items and ESC items into two discrete components in EFA, and the unique relationship between ESC and ecological worldview (NEP). To conclude, the results of Study 1 have lent initial support to the construct validity of HSC-Scale and ESC-Scale and the distinctiveness of the two constructs among Hong Kong local university students.

Study 2: Examining the Factorial Validity of HSC-Scale and ESC-Scale among Local University Students

The aim of Study 2 was to validate the factor structures of the HSC-Scale and ESC-Scale and to explore their nomological network among another sample of Hong Kong local university students. I tested the prediction of humanity self-construal and ecological self-construal on various well-being, prosocial, and pro-environmental indicators, as well as the incremental predictive utility of the two constructs over and above human-nature orientations, conceptually similar constructs, and less inclusive self-construals.

Method

Participants and Procedure

A total of 321 Hong Kong local university students (223 females; M_{age} = 19.63, *SD* = 1.44, age range 18-26) were recruited through mass emailing, following the same procedures of Study 1. Participants came from diverse academic disciplines: arts & humanities (13.7%), business (19.0%), education (4.0%), engineering (10.6%), health & medicine (15.9%), law (1.9%), science (12.5%), and social science (22.4%). The data were collected during the period of January to April 2019. The sample size of the present study was considered adequate for confirmatory factor analysis, as it was larger than the recommended minimum sample size of 200 (Barrett, 2007). Inclusion criteria adopted in this study were the same as Study 1. Informed consent was obtained, confidentiality was assured, demographic information was collected, and Chinese translation was verified, all followed the same procedures and adhered to the same standards of Study 1.

Measures

Humanity Self-Construal. The 6-item Humanity Self-Construal (HSC-) Scale developed in Study 1 was used in this study. The reliability of the scale was good, with

Cronbach's alpha of .87.

Ecological Self-Construal. The 7-item Ecological Self-Construal (ESC-) Scale developed in Study 1 was used in this study. This scale also had good reliability, with Cronbach's alpha of .89.

Well-Being. Psychological outcomes in terms of well-being were measured by a 14-item Mental Health Continuum-Short Form (MHC-SF; Keyes, 2002) that tapped into the emotional, psychological, and social dimensions of well-being. Participants were asked to rate the frequency of the occurrence of each positive feeling in the past month on a 6-point Likert scale, ranging from 1 (*never*) to 6 (*every day*). Sample items were "satisfied with life" for the emotional well-being subscale ($\alpha = .91$), "that you liked most parts of your personality" for the psychological well-being subscale ($\alpha = .89$), and "that the way our society works made sense to you" for the social well-being subscale ($\alpha = .82$). The reliability of all subscales in the present study were good to excellent. The Cronbach's alpha for the whole scale was .93, indicating excellent internal consistency.

Prosocial Attitude. Prosocial attitude was assessed by four items adapted from the Empathic Concern subscale of the Prosocial Personality Battery (PSB; Penner, 2002), tapping into the feelings of empathy and responsibility for the welfare of others. Participants were asked to indicate how much they agree or disagree with each item on a 6-point Likert scale, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). A sample item was "When I see someone being taken advantage of, I feel kind of protective towards them". The internal consistency of the measure was not desirable, with Cronbach's alpha of .59. Such low reliability might be the consequence of the small number of items in the measure (Nunnally & Bernstein, 1994).

Prosocial Behavioral Intention. Prosocial behavioral intention was assessed by three items adapted from the CAF World Giving Index (Charities Aid Foundation, 2018). Participants were asked to indicate how probable they intended to participate in three aspects of prosocial behavior, including helping a stranger, donating money to a humanitarian charity, and volunteering time to a humanitarian organization within the next 12 months on a 5-point Likert scale, ranging from 1 (*not probable*) to 5 (*highly probable*). A sample item was "Help a stranger, or someone you don't know who need help". The internal consistency of the measure was marginally acceptable, with Cronbach's alpha of .68. The low reliability was also possibly due to the small number of items in the measure.

Pro-Environmental Attitude. The 19-item Environmental Attitudes Scale (Heyl, Moyano Díaz, & Cifuentes, 2013) was used to measure individuals' attitude toward various pro-environmental behaviors such as recycling, save and efficient use of energy and water, use of public transportation, environmentally responsible consumption, and participation in environmental action. Participants were asked to indicate how much they agree or disagree with each item on a 6-point Likert scale, ranging from 1 (*strongly disagree*) to 6 (*strongly agree*). A sample item was "I am willing to reduce the consumption of unnecessary products and packaging of difficult degradation". The scale showed good reliability, with Cronbach's alpha of .88.

Pro-Environmental Behavioral Intention. The 11-item Pro-environmental Behavioral Intentions Scale (Halpenny, 2010) was used to measure individuals' intention toward participating in various pro-environmental behaviors. Participants were asked to indicate how probable they intended to participate in each pro-environmental behavior within the next 12 months on a 5-point Likert scale, ranging from 1 (*not probable*) to 5 (*highly probable*). A sample item was "Avoid buying products from companies with poor

environmental records". The reliability of this scale was good, with Cronbach's alpha of .85.

Human-Nature Orientations. Human-nature orientations were assessed by the 33-item Ecocentric, Anthropocentric, and Environmental Apathy Scales (Thompson & Barton, 1994), tapping into individuals' feeling that nature has its own intrinsic value (ecocentrism), nature has no intrinsic value except the provision of material or physical benefits to humans (anthropocentrism), or environmental issues are of no concern to humans (environmental apathy). Participants were asked to indicate how much they agree or disagree with each item on a 5-point Likert scale, ranging from 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items were "Nature is valuable for its own sake" for the ecocentric subscale ($\alpha = .84$), "The most important reason for conservation is human survival" for the anthropocentric subscale ($\alpha = .77$), and "I don't care about environmental problems" for the environmental apathy subscale ($\alpha = .81$). The reliability of all subscales in the present study were acceptable to good.

Individual Self, Relational Self, and Collective Self. As in Study 1, the RIC Scale (E. S. Kashima & Hardie, 2000) with 10 three-part items was used in the present study. All three measures had acceptable reliability, with Cronbach's alphas of .72, .71, and .74, for the individual, relational, and collective parts, respectively.

Identification with All Humanity. As in Study 1, the 9-item humanity subscale of the Identification With All Humanity Scale (IWAH; McFarland et al., 2012) was also used in the present study to measure the degree to which individuals identify themselves with all humanity. The internal consistency of this subscale was good, with Cronbach's alpha of .88.

Connectedness to Nature. As in Study 1, the same 14-item Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004) was used in the present study to measure individuals'

experiential sense of connectedness to nature. The reliability of this scale was good, with Cronbach's alpha of .87.

Results and Discussion

First, I validated the factor structure of the HSC-Scale and ESC-Scale with confirmatory factor analysis (CFA) (see Figure 1). The model fit was evaluated with reference to the cutoff points of Comparative Fit Index (CFI) >.90, Tucker Lewis index (TLI) >.90, root mean square error of approximation (RMSEA) <.08, and standardized root mean square residual (SRMR) <.08 (Bentler & Bonett, 1980; Hu & Bentler, 1999). The two-factor model with seven ESC items for one factor and six HSC items for the other factor fit the data adequately, with CFI = .941, TLI = .928, RMSEA = .068, and SRMR = .042.

Descriptive statistics and bivariate correlations of the variables are presented in Table 4. Consistent with the findings of Study 1, HSC and ESC were strongly and positively correlated (r = .67, p < .01). For human-nature orientations, HSC demonstrated positive correlations with both ecocentrism (r = .39, p < .01) and anthropocentrism (r = .27, p < .01), whereas its correlation with environmental apathy was negative (r = -.12, p < .05). While ESC correlated positively with ecocentrism (r = .61, p < .01) and negatively with environmental apathy (r = -.43, p < .05), its association with anthropocentrism was not significant (r = .09, p > .05). Both HSC and ESC correlated positively with emotional well-being (r = .16, p < .01, and r = .22, p < .01, respectively), psychological well-being (r = .20, p < .01, and r = .28, p < .01, respectively), social well-being (r = .44, p < .01, and r = .30, p < .01, respectively), and overall well-being (r = .32, p < .01, and r = .31, p < .01, respectively). Both HSC and ESC also correlated positively with empathic concern (r = .28, p < .01, and r = .31, p < .01, respectively) and prosocial behavioral intention (r = .36, p < .01, and r = .33, p < .01, respectively). Likewise, both HSC and ESC correlated positively with

pro-environmental attitude (r = .33, p < .01, and r = .55, p < .01, respectively) and pro-environmental behavioral intention (r = .49, p < .01, and r = .47, p < .01, respectively).

Hierarchical regression analyses were conducted to test the prediction of HSC and ESC on various well-being, prosocial, and pro-environmental variables, controlling for demographic variables (Tables 5 and 6). In the first block, I controlled for the effects of age and gender; then HSC and ESC were entered in the second block.

For well-being indicators, HSC positively predicted social well-being (β = .45, p < .001) and overall well-being (β = .21, p = .003). ESC positively predicted emotional well-being (β = .20, p = .006), psychological well-being (β = .27, p < .001), and overall well-being (β = .17, p = .016). For prosocial indicators, both HSC and ESC were positive predictors of empathic concern, β = .14, p = .043, and β = .20, p = .005, respectively; and prosocial behavioral intention, β = .26, p < .001, and β = .14, p = .038, respectively. For pro-environmental indicators, ESC positively predicted pro-environmental attitude, β = .59, p < .001. Both HSC and ESC were positive predictors of pro-environmental behavioral intention, β = .32, p < .001, and β = .26, p < .001, respectively.

To further examine the relative strengths of HSC and ESC on dependent variables, both of which were significant predictors, Chi-square difference tests were conducted to statistically compare the regression paths of HSC and ESC on those variables. The results showed that the effects of HSC and ESC on the overall well-being ($\Delta\chi^2/\Delta df$ = 0.00, p = .985), empathic concern ($\Delta\chi^2/\Delta df$ = 0.48, p = .488), prosocial intention ($\Delta\chi^2/\Delta df$ = 0.37, p = .545), and pro-environmental intention ($\Delta\chi^2/\Delta df$ = 0.00, p = .984) were not significantly different.

I then used another set of hierarchical regression analyses to examine the unique effects of HSC in predicting various well-being, prosocial, and pro-environmental variables

over and above human-nature orientations. In the first block, I controlled for the effects of age and gender; ecocentrism, anthropocentrism, and environmental apathy were entered into the second block; and ESC was added to the third block. The last block contained HSC. The regression results are summarized in Tables 7 and 8.

Regression results for the prediction of well-being indicators showed that HSC positively predicted social well-being, $\beta = .41$, $p < .001$, explaining an additional 8% of the total variance, $F(1, 313) = 33.46$, $p < .001$; and overall well-being, $\beta = .19$, $p = .013$, explaining an additional 2% of the total variance, $F(1, 313) = 6.24$, $p = .013$. Regression results for prosocial indicators showed that HSC positively predicted empathic concern, $\beta = .21$, $p = .004$, explaining an additional 2% of the total variance, $F(1, 313) = 8.22$, $p = .004$; and prosocial behavioral intention, $\beta = .29$, $p < .001$, explaining an additional 4% of the total variance, $F(1, 313) = 16.24$, $p < .001$. Lastly, regression results for pro-environmental variables showed that HSC positively predicted pro-environmental behavioral intention, $\beta = .33$, $p < .001$, explaining an additional 5% of the total variance, $F(1, 313) = 25.18$, $p < .001$. All results had accounted for the effects of age, gender, and ESC, demonstrating the effects of HSC on various well-being, prosocial, and pro-environmental indicators over and above human-nature orientations.

Following the same procedures, I conducted another set of hierarchical regression analyses to examine the effects of ESC in predicting various well-being, prosocial, and pro-environmental variables, over and above human-nature orientations In the first block, I controlled for the effects of age and gender; ecocentrism, anthropocentrism, and environmental apathy were entered into the second block; and HSC was added to the third block. The last block contained ESC. The regression results are summarized in Tables 9 and 10.

Regression results for the prediction of well-being indicators showed that ESC positively predicted emotional well-being, β = .26, p = .003, explaining an additional 3% of the total variance, $F(1, 313) = 8.67$, p = .003; psychological well-being, β = .29, p = .001, explaining an additional 3% of the total variance, $F(1, 313) = 10.71$, p = .001; and overall well-being, β = .22, p = .011, explaining an additional 2% of the total variance, $F(1, 313) = 6.47$, p = .011. However, regression results for the prosocial indicators showed that the predictions of ESC on empathic concern and prosocial behavioral intention were not significant, *ps* > .05. Lastly, regression results showed that ESC positively predicted pro-environmental attitude, β = .12, p = .041, explaining an additional 1% of the total variance, $F(1, 313) = 4.23$, p = .041. All results had accounted for the effects of age, gender, and HSC, demonstrating the effects of ESC on various well-being indicators and pro-environmental attitude over and above human-nature orientations.

To further demonstrate the unique predictive power of HSC and ESC, additional hierarchical analyses were conducted to examine the incremental predictive utility of the two new constructs over and above conceptually similar constructs and less inclusive self-construals.

I first tested the incremental predictive utility of HSC over and above IWAH, a conceptually similar construct. Demographic variables of age and gender were entered into the first block, IWAH was entered into the second block, then HSC was added to the last block. As shown in Table 11, HSC positively and marginally predicted emotional well-being, β = .13, p = .071, explaining an additional 1% of the total variance, $F(1, 316) = 3.27$, p = .071; and psychological well-being, β = .13, p = .073, explaining an additional 1% of the total variance, $F(1, 316) = 3.23$, p = .073. HSC also positively predicted social well-being, β = .43, p < .001, explaining an additional 11.1% of the total variance, $F(1, 316) = 44.13$, p

< .001; and overall well-being, β = .28, p < .001, explaining an additional 4.5% of the total variance, F(1, 316) = 16.01, p < .001. As shown in Table 12, HSC also positively predicted empathetic concern, β = .27, p < .001, explaining an additional 4.2% of the total variance, F(1, 316) = 14.64, p < .001; prosocial behavioral intention, β = .26, p < .001, explaining an additional 4.1% of the total variance, F(1, 316) = 15.52, p < .001; pro-environmental attitude, β = .24, p < .001, explaining an additional 3.4% of the total variance, F(1, 316) = 12.52, p < .001; and pro-environmental behavioral intention, β = .37, p < .001, explaining an additional 8.3% of the total variance, F(1, 316) = 35.40, p < .001. Taken together, HSC was able to demonstrate incremental predictive utility on all well-being, prosocial, and pro-environmental variables over and above IWAH, while the demographic variables were controlled for.

Using the same procedures, I tested the incremental predictive utility of ESC over and above connected to nature, a conceptually similar construct of ESC. I entered age and gender into the first block, connectedness to nature into to the second block, and ESC in the last block of the regression model. As shown in Table 13, ESC positively predicted emotional well-being, β = .23, p = .001, explaining an additional 3.1% of the total variance, F(1, 316) = 10.42, p = .001; psychological well-being, β = .22, p = .002, explaining an additional 2.8% of the total variance, F(1, 316) = 9.81, p = .002; social well-being, β = .25, p < .001, explaining an additional 3.6% of the total variance, F(1, 316) = 12.43, p < .001; and overall well-being, β = .27, p < .001, explaining an additional 4.1% of the total variance, F(1, 316) = 14.35, p < .001. As shown in Table 14, ESC positively predicted empathetic concern, β = .23, p = .001, explaining an additional 3.1% of the total variance, F(1, 316) = 10.98, p = .001; prosocial behavioral intention, β = .20, p = .004, explaining an additional 2.3% of the total variance, F(1, 316) = 8.64, p = .004; pro-environmental attitude, β = .34, p < .001, explaining

an additional 6.7% of the total variance, $F(1, 316) = 33.73$, $p < .001$; and pro-environmental behavioral intention, $\beta = .23$, $p < .001$, explaining an additional 3% of the total variance, $F(1, 316) = 13.49$, $p < .001$. Taken together, ESC was able to demonstrate incremental predictive utility on all well-being, prosocial, and pro-environmental variables over and above connectedness to nature, while the demographic variables were controlled for.

Another set of hierarchical analyses was conducted to examine the incremental predictive utility of HSC and ESC over and above less inclusive self-construals, including individual self, relational self, and collective self. For HSC, I first entered the demographic variables of age and gender into the first block, then I entered individual self, relational self, and collective self into the second block, and then HSC into the last block. As shown in Table 15, HSC positively predicted social well-being, $\beta = .27$, $p < .001$, explaining an additional 5.4% of the total variance, $F(1, 314) = 24.41$, $p < .001$; and overall well-being, $\beta = .12$, $p = .026$, explaining an additional 1.1% of the total variance, $F(1, 314) = 5.00$, $p = .026$; while its prediction on emotional well-being and psychological well-being was not significant, $\beta = .03$, $p = .965$, and $\beta = .02$, $p = .768$, respectively. As shown in Table 16, HSC positively predicted empathetic concern, $\beta = .17$, $p = .004$, explaining an additional 2.3% of the total variance, $F(1, 314) = 8.25$, $p = .004$; prosocial behavioral intention, $\beta = .27$, $p < .001$, explaining an additional 5.5% of the total variance, $F(1, 314) = 21.74$, $p < .001$, pro-environmental attitude, $\beta = .27$, $p < .001$, explaining an additional 5.4% of the total variance, $F(1, 314) = 20.32$, $p < .001$; and pro-environmental behavioral intention, $\beta = .43$, $p < .001$, explaining an additional 13.8% of the total variance, $F(1, 314) = 58.57$, $p < .001$. Taken together, HSC was able to demonstrate incremental predictive utility on two out of four well-being indicators, all prosocial indicators, and all pro-environmental variables over and above

individual, relational, and collective selves, while the demographic variables were controlled for.

Following the same steps, another set of hierarchical analyses was conducted to examine the incremental predictive utility of ESC over and above individual, relational, and collective selves. Demographic variables of age and gender were entered into the first block, then individual self, relational self, and collective self were entered into the second block, then ESC was included in the last block. As shown in Table 17, ESC positively predicted psychological well-being, $\beta = .12$, $p = .031$, explaining an additional 1.1% of the total variance, $F(1, 314) = 4.71$, $p = .031$; and overall well-being, $\beta = .12$, $p = .028$, explaining an additional 1.1% of the total variance, $F(1, 314) = 4.85$, $p = .028$. ESC also positively though marginally predicted social well-being, $\beta = .10$, $p = .065$, explaining an additional 0.8% of the total variance, $F(1, 314) = 3.44$, $p = .065$. However, its prediction on emotional well-being was not significant, $\beta = .08$, $p = .175$. As shown in Table 18, ESC positively predicted empathetic concern, $\beta = .21$, $p < .001$, explaining an additional 3.4% of the total variance, $F(1, 314) = 12.65$, $p < .001$; prosocial behavioral intention, $\beta = .24$, $p < .001$, explaining an additional 4.8% of the total variance, $F(1, 314) = 18.53$, $p < .001$; pro-environmental attitude, $\beta = .52$, $p < .001$, explaining an additional 21.5% of the total variance, $F(1, 314) = 100.87$, $p < .001$; and pro-environmental behavioral intention, $\beta = .42$, $p < .001$, explaining an additional 14% of the total variance, $F(1, 314) = 59.60$, $p < .001$. Taken together, ESC was able to demonstrate incremental predictive utility on three out of four well-being indicators, all prosocial indicators, and all pro-environmental variables over and above individual, relational, and collective selves, while the demographic variables were controlled for. These additional analyses have provided further empirical support for the incremental predictive utility of HSC and ESC, demonstrating the strong and unique predictive power of the two

new constructs, over and above both conceptually similar constructs and less inclusive self-construals.

Results Summary

Study 2 validated the two-factor model that was identified in Study 1. The predictions of HSC and ESC on various well-being, prosocial, and pro-environmental variables, with or without accounting for the effects of human-nature orientations, are summarized below.

Psychological Outcomes. Hypothesis 1a was supported as HSC significantly and positively predicted social well-being and overall well-being, whereas ESC significantly and positively predicted emotional well-being, psychological well-being, and overall well-being. Hypothesis 1b was partially supported as ESC was a stronger predictor than HSC in two (emotional well-being and psychological well-being) out of four well-being indicators, whereas HSC was only stronger than ESC in one (social well-being) out of four. Lastly, Hypothesis 1c was supported as both constructs have demonstrated incremental predictive utility on various well-being indicators. Specifically, HSC was a positive predictor of social well-being, ESC was a positive predictor of emotional well-being and psychological well-being, and both HSC and ESC were positive predictors of overall well-being, over and above human-nature orientations, while controlling for demographic variables.

Prosocial Outcomes. Hypothesis 2a was supported, as both HSC and ESC significantly and positively predicted empathic concern and prosocial behavioral intention. However, Hypothesis 2b was not supported as the effects of the two predictors on prosocial indicators did not significantly differ. Lastly, Hypothesis 2c was partially supported as the effects of HSC on empathic concern and prosocial behavioral intention remained significant, whereas that of ESC diminished, when human-nature orientations were included in the regression model. The results indicated that HSC, but not ESC, was able to explain additional

variance in the prediction of prosociality, over and above human-nature orientations. However, due to the low reliability of the Empathic Concern subscale (α = .59) and the adapted CAF World Giving Index (α = .68), results in relation to these two prosocial variables should be interpreted with caution.

Pro-Environmental Outcomes. Hypothesis 3a was supported, as ESC significantly and positively predicted pro-environmental attitude, while both HSC and ESC significantly and positively predicted pro-environmental behavioral intention. Hypothesis 3b was partially supported as ESC was a stronger predictor than HSC in pro-environmental attitude, while the effects of HSC and ESC on pro-environmental behavioral intention did not statistically differ. Lastly, Hypothesis 3c was largely supported. Specifically, after controlling for the effects of demographic variables, ESC remained a positive predictor of pro-environmental attitude, whereas HSC remained a positive predictor of pro-environmental behavioral intention, over and above human-nature orientations.

The additional analyses conducted have strengthened the evidence for the incremental predictive utility of HSC and ESC as strong and unique predictors of various well-being, prosocial, and pro-environmental indicators, when the effects of conceptually similar constructs and less inclusive self-construals were controlled for.

In sum, the results of Study 2 have provided further empirical support to the factorial validity of the two scales. The regression results largely supported my hypotheses on the effects of HSC and ESC on well-being, prosocial attitude and behavioral intention, and pro-environmental attitude and behavioral intention among Hong Kong local university students.

Study 3 – Further Examining the Factorial Validity of HSC-Scale and ESC-Scale among Three Known Groups in the Local Context

The factor structures of HSC-Scale and ESC-Scale were explored in Study 1 and validated in Study 2, and the regression results of Study 2 also supported most of my hypotheses, but as the findings of both studies were exclusively based upon university student samples, which might not necessarily reflect the values and experiences of the general public (Bello, Leung, Radebaugh, Tung, & Van Witteloostuijn, 2009; Sears, 1986; Wintre, North, & Sugar, 2001). Moreover, as attitudes do not always reflect actual behaviors (Ajzen & Fishbein, 1977; Frymier & Nadler, 2007; LaPiere, 1934; Wicker, 1969), prosocial and pro-environmental attitudes and behavioral intentions tapped in Study 2 might not necessarily correspond to behavioral responses. In this study, I extended the investigation of HSC and ESC beyond university students to community adults, sampling three distinct segments of the population: affiliates of environmental organizations, affiliates of humanitarian organizations, and non-affiliates of either type of organization. I also extended the measures of prosociality and environmentalism from attitudes and behavioral intentions to behaviors.

Method

Participants and Procedure

Four hundred and thirty-four community adults from three distinct groups were invited to participate in an online survey through purposeful snowball sampling, during the period from December 2019 to February 2020. After excluding 13/434 or 3% of the cases due to missing values, 421 cases were retained in the final sample (293 females; M_{age} = 38.67, *SD* = 12.23, age range 18-73). Environmental group comprised 117 self-identified affiliates of environmental organizations, including professional staff and volunteers, who had been actively involved in environmental works in the past 12 months (91 females; *Mage* = 38.60,

SD = 12.52, age range 20-73). Humanitarian group comprised 110 self-identified affiliates of humanitarian organizations, including professional staff and volunteers, who had been actively involved in humanitarian works in the past 12 months (73 females; M_{age} = 39.91, *SD* = 12.79, age range 18-70). Comparison group comprised 194 non-affiliates of humanitarian or environmental organizations (129 females; M_{age} = 38.00, *SD* = 11.74, age range 19-71). The number of participants in each group meets the requirement for a sample size of 101, as calculated by the power analysis of the key measures of Study 2, with a small effect size of Cohen's f^2 = .08 and statistical power of 80% (Cohen, 1988; Erdfelder, Faul, & Buchner, 1996; Selya, Rose, Dierker, Hedeker, & Mermelstein, 2012). Inclusion criteria were age 18 or above, permanent residency of Hong Kong, and ability to read and write traditional Chinese characters. Informed consent was obtained, confidentiality was assured, demographic information was collected, and Chinese translation was verified, all performed in accordance with the same procedures and standards of Study 1.

Measures

Humanity Self-Construal. The 6-item Humanity Self-Construal (HSC-) Scale developed in Study 1 and validated in Study 2 was used in this study (α = .88).

Ecological Self-Construal. The 7-item Ecological Self-Construal (ESC-) Scale developed in Study 1 and validated in Study 2 was used in this study (α = .90).

Well-Being. Psychological outcomes were measured with the same 14-item Mental Health Continuum-Short Form (MHC-SF; Keyes, 2002) as used in Study 2. Cronbach's alphas in this study were .87, .87, .73 and .91, for emotional well-being, psychological well-being, social well-being, and overall well-being, respectively.

Prosocial Behavior. Prosocial behavior was measured by seven items extracted from the Altruism Scale (Rushton, Chrisjohn, & Fekken, 1981) that were applicable to the Hong Kong context. Participants were asked to report the frequency of performing each of the altruistic acts over the past one year on a 5-point Likert scale, ranging from 1 (*never*) to 5 (*very frequent*). A sample item was "I have donated blood" ($\alpha = .80$).

Carbon Emission. Carbon emission was measured with the Low Carbon Living Calculator (LCLC; Environmental Bureau HKSAR, 2020), an online tool that assessed individuals' carbon emission arising from non-industrial/commercial activities in four specific domains: living, travel, clothing, and food. The lower the carbon emission, the lower the negative environmental impact an individual has made, in other words, the more pro-environmental one's lifestyle is. Participants were asked to respond to questions regarding their activities in each domain over the past one year. Sample items for each domain were: expenses in electricity (living); time spent on travelling on buses (travel); the quantity of pre-packaged drinks consumed (food); the number of new clothes and shoes purchased (clothing) etc., on Likert scales.

Human-Nature Orientations. The same 33-item Ecocentric, Anthropocentric, and Environmental Apathy Scales (Thompson & Barton, 1994) that had been used in Study 2 was used in this study. The reliability of all subscales in the present study was acceptable to good, with Cronbach's alphas of .80, .79, .77, for the ecocentrism, anthropocentrism, and environmental apathy subscales, respectively.

Results and Discussion

I first validated the two-factor model in the community sample as a whole using CFA. To stabilize parameter estimates and enhance model fit (Matsunaga, 2008) in this diverse sample, I took a pragmatic-liberal approach (Little, Cunningham, Shahar, & Widaman, 2002)

to fit each latent factor with three parcels, in which each parcel was created by randomly grouping of two HSC items or two to three ESC items (see Figure 2). Cutoff points for model fit evaluation were Comparative Fit Index (CFI) >.90, Tucker Lewis index (TLI) >.90, and standardized root mean square residual (SRMR) <.08 (Bentler & Bonett, 1980; Hu & Bentler, 1999), which were the same as that of Study 2. To improve model fit in this diverse sample, a more lenient cutoff point for root mean square error of approximation (RMSEA) <.10 was used in this study (MacCallum, Browne, & Sugawara, 1996; Vandenberg & Lance, 2000). The model fit was adequate: CFI = .981, TLI = .965, RMSEA = .095, and SRMR = .022. Then I conducted separate CFA for each group (Van de Schoot, Lugtig, & Hox, 2012) with the same parcels. The global fit measures summarized in Table 19 showed that none of the single-group models could be rejected, though minor modifications of error correlations were made to achieve a better fit of the models of environmental affiliates and humanitarian affiliates. Such practical need to correlate error terms in the present study was possibly due to the closely related contents of the scale items and the use of similar wordings (Bollen & Lennox, 1991) between the two scales. The need for error correlations might also reflected the pitfalls of relying on one single method (survey) for data collection (Saris & Aalberts, 2003) in the present study. Although the use of error correlations in SEM has been much debated (Hermida, 2015), it is nevertheless a common and feasible practice in psychological research (Cole, Ciesla, & Steiger, 2007; Landis, Edwards, & Cortina, 2009).

Finally, to ensure meaningful cross-group comparisons of HSC and ESC scores, I validated the two-factor model of the HSC-Scale and ESC-Scale across the three groups with multi-group confirmatory factor analysis (MGCFA) (Jöreskog, 1971). Results of the invariance test are presented in Table 20. First, the unconstrained model showed a satisfactory fit to the data, with CFI = .976, TLI = .954, RMSEA = .060, and SRMR = .057,

indicating that the 2-factor structure was equivalent across groups and thus configural invariance was supported. Second, to test for metric invariance, factor loadings were fixed to be equal across groups. The measurement weights model also fitted the data adequately, with CFI = .972, TLI = .960, RMSEA = .056, and SRMR = .050. Finally, I constrained intercepts across groups, CFI = .948, TLI = .941, RMSEA = .069, and SRMR = .062, and partial scalar equivalence was observed after five out of six intercepts were constrained (Byrne, Shavelson, & Muthén, 1989). As configural, metric, and partial scalar invariance were established, meaningful comparisons of the mean scores of HSC and ESC across the three group were thus permitted (Byrne et al., 1989; Fischer & Karl, 2019; Steenkamp & Baumgartner, 1998).

Descriptive statistics and bivariate correlations of the measures for the whole sample are summarized in Table 21. Consistent with the previous two studies, HSC was strongly and positively correlated with ESC (r = .67, p < .01). Moreover, both HSC and ESC correlated positively with ecocentrism (r = .30, p < .01, and r = .49, p < .01, respectively), and negatively with environmental apathy (r = -.20, p < .05, and r = -.36, p < .05, respectively). Both HSC and ESC correlated positively with emotional well-being (r = .28, p < .01, and r = .20, p < .01, respectively), psychological well-being (r = .25, p < .01, and r = .25, p < .01, respectively), social well-being (r = .28, p < .01, and r = .23, p < .01, respectively), and overall well-being (r = .30, p < .01, and r = .25, p < .01, respectively). Both HSC and ESC also correlated positively with prosocial behavior (r = .31, p < .01, and r = .29, p < .01, respectively); and pro-environmental behavior (r = .30, p < .01, and r = .40, p < .01, respectively). In addition, HSC was negatively correlated with carbon emission in the food domain (r = -.15, p < .05), whereas ESC was negatively correlated with carbon emission in both living (r = -.11, p < .05) and food (r = -.17, p < .05) domains.

A series of analysis of covariance (ANCOVA) were conducted to compare the mean differences of HSC and ESC across the three groups, controlling for demographic variables of age, gender, education, and income. As summarized in Table 22, there was a statistically significant between-group difference in HSC, $F(2, 412) = 6.70$, $p = .001$, $\eta_p^2 = .031$. Post-hoc comparisons using Bonferroni tests indicated that environmental affiliates ($M = 5.21$, $SD = 0.92$) scored significantly higher than humanitarian affiliates ($M = 4.87$, $SD = 1.07$), $p = .034$, and non-affiliates ($M = 4.75$, $SD = 1.07$), $p = .001$; whereas humanitarian affiliates and non-affiliates did not differ significantly, $p = 1.000$. There was also a statistically significant between-group difference in ESC, $F(2,412) = 16.01$, $p < .001$, $\eta_p^2 = .072$. Post-hoc comparisons using Bonferroni tests indicated that environmental affiliates ($M = 6.13$, $SD = 0.56$) also scored significantly higher than humanitarian affiliates ($M = 5.72$, $SD = 0.84$), $p < .001$, and non-affiliates ($M = 5.58$, $SD = 0.81$), $p < .001$; whereas humanitarian affiliates and non-affiliates did not differ significantly, $p = .606$.

In addition, between-group differences in various well-being, prosocial, and pro-environmental indicators were also observed, after age, gender, education, and income were controlled for. The ANCOVA findings are also summarized in Table 22.

For well-being indicators, emotional well-being ($M_{Env} = 4.07$, $SD_{Env} = 1.14$; $M_{Hum} = 4.13$, $SD_{Hum} = 1.15$; $M_{Non} = 3.84$, $SD_{Non} = 1.22$) and psychological well-being ($M_{Env} = 4.06$, $SD_{Env} = 1.02$; $M_{Hum} = 4.18$, $SD_{Hum} = 1.01$; $M_{Non} = 3.88$, $SD_{Non} = 1.10$) did not differ among the three groups, $F(2, 412) = 1.47$, $p = .231$, $\eta_p^2 = .007$, and $F(2, 412) = 2.20$, $p = .112$, $\eta_p^2 = .011$, respectively. However, there was a statistically significant between-group difference in social well-being, $F(2, 412) = 11.33$, $p < .001$, $\eta_p^2 = .052$. Post-hoc comparisons using Bonferroni tests indicated that non-affiliates ($M = 2.73$, $SD = 1.05$) scored significantly lower than environmental affiliates ($M = 3.24$, $SD = 1.02$), $p < .001$, and humanitarian affiliates (*M*

= 3.21, *SD* = 1.02), *p* = .001; whereas environmental affiliates and humanitarian affiliates did not differ significantly, *p* = 1.000. There was also a statistically significant group difference in overall well-being, $F(2, 412) = 4.89$, $p = .008$, $\eta_p^2 = .023$. Post-hoc comparisons using Bonferroni tests indicated that non-affiliates (*M* = 3.48, *SD* = 0.99) scored significantly lower than environmental affiliates (*M* = 3.79, *SD* = 0.97), *p* = .041, and humanitarian affiliates (*M* = 3.84, *SD* = 0.93), *p* = .022; whereas environmental affiliates and humanitarian affiliates did not differ significantly, *p* = 1.000.

In addition, there was a statistically significant between-group difference in prosocial behavior, $F(2, 412) = 11.83$, $p < .001$, $\eta_p^2 = .054$. Post-hoc comparisons using Bonferroni tests indicated that non-affiliates (*M* = 2.87, *SD* = 0.67) scored significantly lower than environmental affiliates (*M* = 3.22, *SD* = 0.77), *p* < .001, and humanitarian affiliates (*M* = 3.18, *SD* = 0.62), *p* = .001; whereas environmental affiliates and humanitarian affiliates did not differ significantly, *p* = 1.000.

For pro-environmental indicators, there was a statistically significant between-group difference in pro-environmental behavior, $F(2, 412) = 27.99$, $p < .001$, $\eta_p^2 = .120$. Post-hoc comparisons using Bonferroni tests indicated that environmental affiliates (*M* = 3.95, *SD* = 0.57) scored significantly higher than humanitarian affiliates (*M* = 3.49, *SD* = 0.78), *p* < .001, and non-affiliates (*M* = 3.31, *SD* = 0.74), *p* < .001; whereas humanitarian affiliates and non-affiliates did not differ significantly, *p* = .201.

Moreover, there was a statistically significant between-group difference in carbon emission by living, $F(2, 403) = 5.42$, $p = .005$, $\eta_p^2 = .026$. Post-hoc comparisons using Bonferroni tests indicated that environmental affiliates (*M* = 1.12, *SD* = 0.51) scored significantly lower than humanitarian affiliates (*M* = 1.43, *SD* = 0.64), *p* = .031, and non-

affiliates (M = 1.44, SD = 0.88), p = .006; whereas humanitarian affiliates and non-affiliates did not differ significantly, p = 1.000. There was also a statistically significant between-group difference in carbon emission by food, $F(2, 403) = 7.77$, $p < .001$, $\eta_p^2 = .037$. Post-hoc comparisons using Bonferroni tests indicated that environmental affiliates (M = 1.86, SD = 0.39) scored significantly lower than humanitarian affiliates (M = 2.04, SD = 0.45), p = .003, and non-affiliates (M = 2.04, SD = 0.39), p = .001; whereas humanitarian affiliates and non-affiliates did not differ significantly, p = 1.000. Similarly, there was also a statistically significant between-group difference in carbon emission by clothing, $F(2, 403) = 6.01$, p = .003, $\eta_p^2 = .029$. Post-hoc comparisons using Bonferroni tests indicated that environmental affiliates (M = 0.16, SD = 0.20) scored significantly lower than humanitarian affiliates (M = 0.25, SD = 0.24), p = .009, and non-affiliates (M = 0.24, SD = 0.25), p = .006; whereas humanitarian affiliates and non-affiliates did not differ significantly, p = 1.000. However, the three groups did not differ on carbon emission by travel (M_{Env} = 2.25, SD_{Env} = 1.91; M_{Hum} = 2.49, SD_{Hum} = 2.38; M_{Non} = 2.12, SD_{Non} = 2.66) and total carbon emission (M_{Env} = 5.39, SD_{Env} = 1.97; M_{Hum} = 6.21, SD_{Hum} = 2.55; M_{Non} = 5.85, SD_{Non} = 3.02), $F(2, 403) = 0.41$, p = .665, $\eta_p^2 = .002$, and $F(2, 403) = 2.68$, p = .070, $\eta_p^2 = .013$, respectively.

Hierarchical regression analyses were conducted to test the prediction of HSC and ESC on various well-being, prosocial, and pro-environmental variables, controlling for demographic variables. Age, gender, education, and income were entered into the first block; then HSC and ESC were entered into the second block.

As summarized in Tables 23-25, HSC was a positive predictor of all well-being indicators, including emotional well-being, $\beta = .24$, $p < .001$; psychological well-being, $\beta = .13$, p = .037; social well-being, $\beta = .21$, p = .001; and overall well-being, $\beta = .22$, p = .001. ESC was a positive predictor of psychological well-being, $\beta = .15$, p = .020. Both HSC and

ESC were positive predictors of prosocial behavior, β = .17, p = .006, and β = .18, p = .004, respectively. ESC positively predicted pro-environmental behavior, β = .36, p < .001; and negatively predicted both carbon emission by living, β = -.14, p = .032; and carbon emission by food, β = -.13, p = .042. Unexpectedly, HSC positively predicted carbon emission by clothing, β = .13, p = .048.

As both HSC and ESC were significant predictors of psychological well-being and prosocial behavior, Chi-square difference tests were conducted to compare the regression paths of the two predictors on the two variables. The results showed that the effects of HSC and ESC on psychological well-being ($\Delta\chi^2/\Delta df$ = 2.19, p = .139) and prosocial behavior ($\Delta\chi^2/\Delta df$ = 2.38, p = .123) were not significantly different.

Additional hierarchical regression analyses were performed to explore whether HSC and ESC might account for the observed differences in some dependent variables across the three groups. For the variables of social well-being, overall well-being, and prosocial behavior, the significant group differences were between non-affiliates and the other two groups (environmental affiliates and humanitarian affiliates), while the two affiliate groups did not significantly differ. Therefore, two dummy variables were created to represent the difference between non-affiliates and environmental affiliates, and the difference between non-affiliates and humanitarian affiliates, respectively. To examine the effect of HSC for the observed group differences, demographic variables were entered into the first block, two dummy variables were put into to the second block, then HSC was added to the last block. Regression results in Table 26 showed that HSC positively predicted social well-being, β = .24, p < .001, accounting for an additional 5.5% of the total variance, F(1, 411) = 25.62, p < .001; and overall well-being, β = .27, p < .001, accounting for an additional 6.7% of the total variance, F(1, 411) = 31.98, p < .001. HSC also positively predicted prosocial behavior,

$\beta = .27$, $p < .001$, accounting for an additional 6.8% of the total variance, $F(1, 411) = 33.37$, $p < .001$.

For various environmental indicators, including pro-environmental behavior, carbon emission by living, carbon emission by food, and carbon emission by clothing, the significant group differences were between environmental affiliates and the other two groups (humanitarian affiliates and non-affiliates), while the two groups did not significantly differ. Therefore, two dummy variables were created to represent the difference between environmental affiliates and humanitarian affiliates, and the difference between environmental affiliates and non-affiliates, respectively. To examine the effect of HSC for the observed group differences, demographic variables were entered into the first block, two dummy variables were added to the second block, while HSC was entered into the last block. Regression results in Table 27 showed that HSC positively predicted pro-environmental behavior, $\beta = .23$, $p < .001$, accounting for an additional 4.8% of the total variance, $F(1, 411) = 25.17$, $p < .001$. HSC also negatively though marginally predicted carbon emission by food, $\beta = -.09$, $p = .058$, accounting for an additional 0.8% of the total variance, $F(1, 402) = 3.62$, $p = .058$. Lastly, HSC positively predicted carbon emission by clothing, $\beta = .12$, $p = .018$, accounting for an additional 1.3% of the total variance, $F(1, 402) = 5.65$, $p = .018$. However, HSC did not account for the observed group difference in carbon emission by living, $\beta = .00$, $p = .575$.

Using the same procedures, I also examined the effect of ESC for the above observed group differences. For the analyses of well-being and prosocial indicators, demographic variables were entered into the first block, two dummy variables (one represented the difference between non-affiliates and environmental affiliates, the other one represented the difference between non-affiliates and humanitarian affiliates) were added to the second block,

and ESC was entered into the last block. Regression results in Table 28 showed that ESC positively predicted social well-being, $\beta = .19$, $p < .001$, accounting for an additional 3.1% of the total variance, $F(1, 411) = 14.26$, $p < .001$; and overall well-being, $\beta = .22$, $p < .001$, accounting for an additional 4.3% of the total variance, $F(1, 411) = 20.22$, $p < .001$. ESC also positively predicted prosocial behavior, $\beta = .26$, $p < .001$, accounting for an additional 6.3% of the total variance, $F(1, 411) = 30.66$, $p < .001$. For the analyses of environmental indicators, demographic variables were entered into the first block, two dummy variables (one represented the difference between environmental affiliates and humanitarian affiliates, the other one represented the difference between environmental affiliates and non-affiliates) were added to the second block, and ESC was entered into the last block. Regression results in Table 29 showed that ESC positively predicted pro-environmental behavior, $\beta = .32$, $p < .001$, accounting for an additional 8.9% of the total variance, $F(1, 411) = 49.18$, $p < .001$. ESC also negatively predicted carbon emission by food, $\beta = -.11$, $p = .022$, accounting for an additional 1.2% of the total variance, $F(1, 402) = 5.32$, $p = .022$. However, ESC did not account for the observed group differences in carbon emission by living ($\beta = -.04$, $p = .422$) and carbon emission by clothing ($\beta = .06$, $p = .209$).

Taken together, HSC and ESC were able to account for most of the observed group differences in various well-being, prosocial, and pro-environmental indicators, lending support to the incremental utility of HSC-Scale and ESC-Scale. Specifically, both HSC and ESC accounted for the group differences in social well-being, overall well-being, prosocial behavior, and pro-environmental behavior. Both HSC and ESC also accounted for the group difference in carbon emission by food, though the effect of HSC was marginal. HSC but not ESC was able to account for the group difference in carbon emission by clothing, though the prediction was not in the direction I expected.

I then used another set of hierarchical regression analyses to examine the effects of HSC in predicting various well-being, prosocial, and pro-environmental indicators, over and above human-nature orientations. In the first block, I controlled for the effects of age, gender, education, and income; ecocentrism, anthropocentrism, and environmental apathy were entered into the second block; and ESC was added to the third block. The last block contained HSC.

As shown in Table 30, HSC positively predicted emotional well-being, $\beta = .22$, $p < .001$, explaining an additional 3% of the total variance, $F(1, 409) = 12.44$, $p < .001$; social well-being, $\beta = .18$, $p = .003$, explaining an additional 2% of the total variance, $F(1, 409) = 8.75$, $p = .003$; and overall well-being, $\beta = .20$, $p = .001$, explaining an additional 2% of the total variance, $F(1, 409) = 10.28$, $p = .001$. HSC also positively predicted prosocial behavior, $\beta = .19$, $p = .002$, explaining an additional 2% of the total variance, $F(1, 409) = 9.31$, $p = .002$ (Table 31). However, the predictions of HSC on pro-environmental behavior (Table 31) and all indicators of carbon emission (Table 32) were not significant, $ps > .05$. All results had accounted for the effects of demographics and ESC, showing the effects of HSC on well-being and prosocial indicators, over and above human-nature orientations.

Following the same procedures, I conducted another set of hierarchical regression analyses to examine the unique effects of ESC in various well-being, prosocial, and pro-environmental variables, over and above human-nature orientations. In the first block, I controlled for the effects of age, gender, education, and income; ecocentrism, anthropocentrism, and environmental apathy were entered into the second block; and HSC was added to the third block. The last block contained ESC.

Regression results for the well-being variables (Table 33) showed that ESC positively predicted psychological well-being, β = .19, p = .005, explaining an additional 2% of the total variance, F(1, 409) = 7.89, p = .005; social well-being, β = .14, p = .038, explaining an additional 1% of the total variance, F(1, 409) = 4.32, p = .038; and overall well-being, β = .15, p = .027, explaining an additional 1% of the total variance, F(1, 409) = 4.93, p = .027. However, the prediction of ESC on prosocial behavior was not significant, p = .277 (Table 34). For the predictions on pro-environmental variables, ESC positively predicted pro-environmental behavior, β = .19, p = .002, explaining an additional 2% of the total variance, F(1, 409) = 9.56, p = .002 (Table 34), though its effects on all carbon emission indicators were not significant, ps > .05 (Table 35). All results had accounted for the effects of demographics and HSC, showing the effects of ESC on well-being and pro-environmental variables over and above human-nature orientations.

Results Summary

In Study 3, the factorial validity of the HSC-Scale and ESC-Scale were further confirmed among the Hong Kong local community sample as a whole and across the three groups of environmental affiliates, humanitarian affiliates, and non-affiliates. The group differences of HSC scores, ESC scores, and other variables, and the effects of HSC and ESC on various well-being, prosocial, and pro-environmental indicators, with or without accounting for the effects of human-nature orientations, were summarized below:

Group Differences in HSC and ESC and Other Variables. The results of ANCOVA showed that environmental affiliates scored significantly higher than humanitarian affiliates and non-affiliates on both HSC and ESC, while the scores between humanitarian affiliates and non-affiliates were not significantly different.

The finding that environmental affiliates scored significantly higher on ESC than the two other groups support my argument that people who endorse all entities of nature in their sense of self would concern about the negative environmental impacts on both humans and nonhumans. Such concern can manifest itself in the form of overt pro-environmental behavior, such as participating in environmental organizations. However, the intriguing finding that environmental affiliates scored significantly higher on HSC than the other two groups is particularly noteworthy. At first glance, it may seem a bit paradoxical that people high on HSC would dedicate themselves to environmental organizations rather than humanitarian organizations. However, a closer examination would reveal that this interesting phenomenon is consistent with my postulation that people who endorse all humanity in their sense of self would concern about the aversive environmental impacts on humans. Such concern, likewise, may possibly translate into their behavior of affiliating with environmental organizations. Moreover, the past few years has seen a global rise in environmental concern (Lampert, Gambarin, Liu, & Metaal, 2019), implying that people are becoming more aware of the environmental challenges that all humanity is facing and the urgency of immediate action to fight against this shared destiny. Such heightened awareness may explain why people with higher HSC were driven to participate in environmental organizations even more than in humanitarian organizations, as environmental crisis was possibly perceived to be more pressing, detrimental, and far-reaching than other humanitarian issues.

Moreover, ANCOVA results that social well-being, overall well-being, and prosocial behavior were significantly lower among non-affiliates than environmental affiliates and humanitarian affiliates indicated that affiliation, irrespective of the type, might be conducive to optimal social functioning, overall positive mental health, and prosociality. ANCOVA results also showed that environmental affiliates were significantly more environmental than

the other two groups, indicating that participating in environmental organizations might also be conducive to environmentalism. Additional hierarchical regression analyses demonstrated that most of the group differences in various well-being, prosocial, and pro-environmental indicators could be explained by HSC and ESC, providing further support for the incremental validity of the HSC-Scale and ESC-Scale.

However, while environmental affiliates were significantly more pro-environmental than the other two groups in most pro-environmental variables, the three groups did not significantly differ in carbon emission by travel and total carbon emission. One possible explanation for non-significant group difference in carbon emission by travel is that in a densely populated city with fast pace of life, public transportation network is a reliable and efficient means of travel for most Hong Kong people. Government figures also show that 12.6 million passenger journeys are made on a public transport system daily in Hong Kong (Transport Department, 2019), which is a huge number as compared to our population of 7.4 million (Census and Statistics Department, 2021). For many, using which kind of public transport and for how long might not be a matter of personal choice, as it largely depends on the areas one lives and works, and the distance between the two. For areas that more environmental public transportation such as railways and buses do not cover, one might resort to less environmental alternatives such as taxis, irrespective of their group affiliation. In contrast, economic status might be more important than group affiliation in predicting carbon emission by travel, as affluent participants might be more likely to own a private car and afford more oversea trips than less affluent participants. Therefore, it was not surprising that income was a very strong positive predictor of carbon emission by travel (Table 25). To understand why the three groups did not differ in total carbon emission, we may examine Table 22 showing total carbon emission as a composite score of carbon emission across the

four domains of living, travel, food, and clothing, among which travel was a major contributor that made up 36 to 42% of the total carbon emission across groups. Therefore, despite the existence of significant group differences in carbon emission in three out of four domains, the group difference in total carbon emission was not significant.

Psychological Outcomes. Hypothesis 1a was supported as HSC significantly and positively predicted all well-being indicators including emotional, psychological, and social well-being, as well as overall well-being, whereas ESC significantly and positively predicted psychological well-being. Hypothesis 1b was not supported as HSC was a stronger predictor than ESC on three (emotional well-being, social well-being, and overall well-being) out of four well-being indicators, whereas the predictive strengths of HSC and ESC on psychological well-being did not significantly differ. Hypothesis 1c was supported as HSC and ESC added significant variance to well-being indicators. Specifically, HSC was a positive predictor of emotional well-being, social well-being, and overall well-being, over and above human-nature orientations, while demographic variables and ESC were controlled for. ESC was a positive predictor of psychological well-being, social well-being, and overall well-being, over and above human-nature orientations, while demographic variables and HSC were controlled for. One noteworthy observation was that the addition of human-nature orientations to the regression models changed the prediction strength of ESC on social well-being and overall well-being from non-significant to significant, indicating that part of the originally unexplained variance was explained by the inclusion of human-nature orientations variables. This interesting phenomenon may possibly be interpreted by the concept of suppression (Cheung & Lau, 2008; Pandey & Elliott, 2010); that is, the inclusion of human-nature orientations in the models helped suppress some unexplained variance and thus

improved the predictive power of ESC, leading to the changes of regression coefficients from non-significant to significant.

Prosocial Behavior. Hypothesis 2a was supported, as both HSC and ESC significantly and positively predicted prosocial behavior. Consistent with the results of Study 2, Hypothesis 2b was not supported as the effects of the two predictors on prosocial behavior did not significantly differ. Also consistent with the results of Study 2, Hypothesis 2c was partially supported, as only HSC was able to exhibit incremental predictive utility on prosocial behavior. Specifically, when human-nature orientations variables were included in the regression model, the effect of HSC on prosocial behavior remained significant, whereas the effect of ESC became non-significant. The findings suggested that the inclusion of human-nature orientations in the regression model would take up some of the variance that was originally explained by ESC. The drop in variance explained by ESC was large enough to change the regression coefficient of ESC from significant to non-significant, indicating that ESC was unable to demonstrate incremental predictive utility on prosocial behavior over and above human-nature orientations.

Pro-Environmental Variables. Hypothesis 3a was partially supported. Specifically, ESC was a unique positive predictor of pro-environmental behavior, and a unique negative predictor of carbon emission by living and by food. However, while HSC failed to predict pro-environmental behavior, it was, counterintuitively, a significant and positive predictor of carbon emission by clothing. One possible explanation for this interesting finding is that as compared to people with lower HSC, people with higher HSC are conceptually more likely to encompass other humans in their sense of self. Such expansion of self may lead them to a perspective shift to experience the world from others' viewpoint, monitoring how they are evaluated by others as objects (Goffman, 1978; Leary, 1995). To improve their impression on

others, they may try to enhance their physical appearance with new clothes and new shoes. The environmental impact of their purchase is thus reflected by the size of the carbon footprint they produced. Hypothesis 3b was supported as ESC was the only significant predictor of pro-environmental behavior, and the only predictor of various carbon emission indicators in the expected direction. Lastly, Hypothesis 3c was partially supported, as ESC was able to exhibit incremental predictive utility on pro-environmental behavior. Specifically, when human-nature orientations were included in the regression model, the positive effect of ESC on pro-environmental behavior was able to retain, while both the effects of HSC and ESC on carbon emission became non-significant. The results indicated that ESC, but not HSC, was able to explain additional variance in the prediction of pro-environmental behavior over and above human-nature orientations.

In sum, the CFA and MGCFA results of Study 3 have lent further empirical support to the factorial validity of the HSC-Scale and ESC-Scale, supporting general applicability of the two scales among community adults as a whole and across three distinct groups of environmental affiliates, humanitarian affiliates, and non-affiliates in the local context. The ANCOVA results that both HSC and ESC were significantly higher among environmental affiliates than the other two groups indicated an intriguing phenomenon that participating in environmental organizations could be one form of behavioral manifestation of including all humanity or all entities of nature in one's sense of self. The regression results of the current study also largely supported my hypotheses on well-being, prosociality, and environmentalism of HSC and ESC among Hong Kong local community adults, which were broadly consistent with the results obtained from Study 2 that sampled Hong Kong local university students.

Study 4: Further Validating the HSC-Scale and ESC-Scale in a Diverse Global Context

Studies 1 to 3 have psychometrically examined and validated the HSC-Scale and ESC-Scale among local university students and across three local groups in Hong Kong. To make psychology a truly global discipline, it is important to extend psychological research beyond a single region to more diverse cultural contexts by applying psychological theories and instruments in different countries/societies (Davidov, 2009; Fischer & Karl, 2019). However, as with many other psychological instruments, the two scales I developed and validated locally may not be applicable to other cultures, as the score differences emerged could be attributed to the deficiencies of the measurement tools rather than the characteristics of different countries/societies (Brown, Harris, O'Quin, & Lane, 2017; Davidov, 2009; Fischer & Karl, 2019). To make cross-cultural application possible, the very first step is to establish measurement invariance (Hui & Triandis, 1985). In this study, I moved beyond the local context of Hong Kong and collected data from 12,253 community adults across 35 countries/societies, as to examine the legitimacy of applying the two scales among diverse cultural contexts.

Method

Participants and Procedure

A total of 12,253 community adults aged 18 to 89 years (6,267 females; M_{age} = 43.46, *SD* = 14.94), from 35 countries/societies across Asia, Europe, North America, South America, Oceania, and Africa, completed the HSC-Scale and ESC-Scale, as part of a large-scale global survey (Chen et al., 2021). The 35 countries/societies were selected with reference to the Inglehart–Welzel World Cultural Map (Inglehart & Welzel, 2020), covering all eight cultural zones of Confucian, Catholic Europe, Protestant Europe, English-speaking, West and South Asia, Orthodox Europe, Latin America, and African Islamic. The data were

collected in April 2020 through an online panel. The scale was administered in the native language of each country/society, following the standard procedures of translating from English to the target languages and then back-translating to English. A total of 23 language versions of the scale were used in this study. The average sample size for each country/society was 350, ranging from 196 in the Netherlands to 464 in Indonesia.

Measures

Humanity Self-Construal. The 6-item Humanity Self-Construal (HSC-) Scale was used in this study. The average Cronbach's alpha across the 35 countries/societies was .92, indicating excellent internal consistency. Cronbach's alphas ranged from .88 in India to .95 in the United States, indicating good to excellent reliability.

Ecological Self-Construal. The 7-item Ecological Self-Construal (ESC-) Scale was used in this study. The average Cronbach's alpha across the 35 countries/societies was .90, indicating excellent internal consistency. Cronbach's alphas ranged from .85 in Mexico to .93 in Taiwan, indicating good to excellent reliability.

Results and Discussion

Following the same procedures and using the same parcel combinations of Study 3, I first validated the models of the HSC-Scale and ESC-Scale in the global sample as a whole using CFA. Cutoff points for model fit evaluation were the same as that of Study 3, with Comparative Fit Index (CFI) >.90, Tucker Lewis index (TLI) >.90, standardized root mean square residual (SRMR) <.08 (Bentler & Bonett, 1980; Hu & Bentler, 1999), and root mean square error of approximation (RMSEA) <.10 (MacCallum et al., 1996; Vandenberg & Lance, 2000). The model fit was adequate: CFI = .991, TLI = .983, RMSEA = .078, and SRMR = .020. Then I conducted separate CFA for each of the countries/societies (Van de Schoot et al., 2012) with the same parcels. The global fit measures summarized in Table 36

showed that none of the single-country/society models could be rejected, though minor modifications of error correlations were made to achieve a better fit of the models of about half of the countries/societies (Davidov, 2009), implying that the measures of HSC-Scale and ESC-Scale generally produced an acceptable fit to all 35 countries/societies. For most countries/societies, error correlations were applied within the same construct. However, it is noteworthy that some errors were correlated between the two constructs among South Korea, Singapore, Finland, and Sweden, indicating that the relationship between HSC and ESC might be more complicated in these cultures. Finally, a multi-group confirmatory factor analysis (MGCFA) was performed to confirm the three levels of measurement invariance (Jöreskog, 1971) of the models of the HSC-Scale and ESC-Scale across 35 countries/societies. The fit indices were CFI = .981, TLI = .965, RMSEA = .018, SRMR = .051, for the unconstrained model; CFI = .977, TLI = .970, RMSEA = .017, SRMR = .051, for the measurement weights model; and CFI = .925, TLI = .918, RMSEA = .027, and SRMR = .053, for the intercept measurements model after four out of six intercepts were constrained (Byrne et al., 1989) (see Table 37). As configural, metric, and partial scalar invariance were achieved, meaningful comparisons of the mean scores of HSC and ESC across the 35 countries/societies were thus applicable (Byrne et al., 1989; Fischer & Karl, 2019; Steenkamp & Baumgartner, 1998). Descriptive statistics for each country/society are summarized in Table 38.

Results Summary

The findings of Study 4 evidenced that the HSC-Scale and ESC-Scale had the same measurement properties across the 35 countries/societies and that members of different countries/societies ascribed the same meanings to scale items (Milfont & Fischer, 2010), implying that the mean scores of HSC and ESC could be directly compared across the 35

countries/societies (Fischer & Karl, 2019). It also ruled out the possibility that cross-country/society differences were due to systematic biases of responses or differences in understanding of questions (Davidov, 2009), implying that any cross-country/society difference could be meaningfully interpreted based upon the conceptualization of the two theoretical constructs (Davidov, 2009; Fischer & Karl, 2019). The establishment of the measurement invariance of the two scales that were translated in 23 different linguistic environments and administered within 35 different cultural contexts has thus laid important groundwork for the potentiality of using the research tools in future cross-cultural investigation.

General Discussion

The present project set out to investigate the possibility of expanding the existing theoretical framework of self-construal with reference to the core concepts across philosophy and different areas of psychology. I refined the construct of humanity self-construal (HSC), which refers to an expanded self-representation that is defined by its connectedness to humankind, as differentiated from other nonhuman entities. I also proposed a construct termed ecological self-construal (ESC), which denotes an expanded self-representation that is defined by its connectedness to all entities of nature, including humans. I explored and validated the new measures of humanity self-construal and ecological self-construal and examined the psychological, prosocial, and pro-environmental outcomes of the two constructs in four cross-sectional studies, sampling participants across local university students (Studies 1 & 2), three distinct groups from local community (Study 3), and community adults from 35 countries/societies (Study 4).

The findings of the four studies evidenced that humanity self-construal and ecological self-construal are two distinct constructs, which are relevant to both university students (Studies 1 & 2) and community adults (Studies 3 & 4), and applicable to both Hong Kong local (Studies 1-3) and cross-cultural (Study 4) contexts. The combined findings of Study 2 and Study 3 provide some conceptual premises that both humanity self-construal and ecological self-construal are predictive of well-being, whereas humanity self-construal is relatively more predictive of prosociality and ecological self-construal is relatively more predictive of environmentalism.

However, some methodological issues might need to be acknowledged. In Studies 1 to 3, around two-third of the participants were women. Such gender bias in participation is consistent with previous studies that women are more likely than men to respond to survey invitation (Porter & Umbach, 2006; Porter & Whitcomb, 2005; Van Mol, 2017). The high percentage of female participants might also be partly explained by the gender skewness in Hong Kong population that there are more female (53.3%) than male university students (46.7%), and more female (52.4%) than male (47.6%) citizens in the population (Census and Statistics Department, 2020). Therefore, to focus on the target variables that the present project aimed to examine, all analyses reported in this thesis had controlled for the effects of gender and other demographic variables.

Besides, in view of the cross-sectional design and self-report nature of the studies, the validity of the research findings and relationships between variables might be confounded by the common method bias (CMB) (Podsakoff, MacKenzie, Lee, & Podsakoff, 2003). Therefore, Harman's single-factor test was conducted to examine the extent of common method bias in each study (Harman, 1976). Specifically, all items in each study were loaded into a single factor through an exploratory factor analysis. The results of post-hoc test in all

four studies showed the total variance explained by one factor were under 20%, which were much lower than the CMB threshold of 50%, indicating that the data in the present project had not been affected by the CMB.

Some conceptual issues might also need further clarification. The proposal of ecological self-construal (ESC) in my project was to fill the gap in the self-construal literature between Harb and Smith's (2008) construct humanity self-construal that captures the sense of self up to the humanity level, and Decicco & Stroink's (2007) construct metapersonal self-construal that captures the sense of self up to the cosmos level. Therefore, I consider ESC as a missing link in the self-construal literature that was intellectually worthwhile to examine and make original contribution to the knowledge. By proposing ESC in the self-construal framework, my ambition is not merely to engage in the current debates, but to incite more debates in the self-construal literature. For example, is it possible for the self to further expand to transcend the physical world and unite with the Universe, as described in the Taoist doctrine that denotes the correspondence between our sense of self (microcosm) and the Universe (macrocosm)? Or conversely, is it possible for the self to contract and reduce to some insignificant lifeforms, such as a mayfly; or some inanimate objects, such as an iPhone? These are important philosophical questions that have yet to be answered.

The explicit inclusion of humans in the conceptualization of ecological self-construal and in the items of ESC-Scale has resulted in the large conceptual overlap between HSC and ESC and has made the two constructs less differentiable. However, such inclusion is important and justifiable, as what we measure shapes what we discuss, what we study, and what we think about what natural entities really are. Such inclusion has filled the gap that some earlier self-nature measures tended to shy away from. The resulting conceptual overlap precisely reflects the increasing inclusiveness of the self when it expands from HSC to ESC,

and the way that the more inclusive level transcends the properties of the less inclusive ones. Nevertheless, more empirical studies are needed to examine how the two constructs can be better differentiated.

Project Significance

The present project has made several important contributions - conceptually, empirically, and practically.

Conceptual Contributions

To the best of my knowledge, the present project is the first academic venture to redefine self-nature relationship within the self-construal framework, addressing a much-needed clarification of the long-standing confusion and vagueness in the philosophical conceptualization of *nature* in past literature. The present project has bridged the theoretical gaps in self-construal by connecting the dots across several core concepts in philosophy, personality psychology, humanistic psychology, and social psychology, broadening the scope of self-construal investigation from self-social relationship to self-humanity and self-nature relationship, and building up a solid theoretical base to the conceptualization of humanity self-construal and ecological self-construal.

Empirical Contributions

The present project is the first empirical investigation that dedicates to differentiating the theoretical constructs of including all humanity and including all entities of nature in the self. It also appears to be the first comprehensive assessment of the psychological, prosocial, and pro-environmental effects of self-expansion on the humanity and natural levels. The testing of measurement invariance of the HSC-Scale and ESC-Scale in 23 linguistic contexts and across 35 countries/societies in Study 4 has provided empirical support to the potentiality

of applying the two scales in future cross-cultural research, joining in the concerted effort in making psychology a global discipline.

Practical Contributions

Besides conceptual and empirical contributions, the findings of the present project also have several practical implications which are particularly relevant to the psychological, prosocial, and pro-environmental issues arisen during the COVID-19 pandemic.

By the time this thesis is written, the world has already been ravaged by COVID-19 for more than a year (World Health Organization, 2021). Across the globe, more than one hundred and twenty million people have been infected, almost three million human lives have been lost (Worldometer, 2021), while the actual number of individuals and families traumatized will never been known. This unprecedented pandemic might have profoundly impacted our well-being and drastically changed our prosocial and pro-environmental behaviors.

Specifically, confinement and lockdown might leave people feeling lonely and socially isolated (Ammar et al., 2020; Loades et al., 2020; Odriozola-González, Planchuelo-Gómez, Irurtia, & de Luis-García, 2020; Sachs et al., 2020). Perceived pathogen threat from a novel infectious disease might make people hold more ethnocentric and exclusionary view toward outgroups (Navarrete & Fessler, 2006; Yamagata, Teraguchi, & Miura, 2020), which ultimately make them less willing to help ethnic and cultural others. When people are panicked by a greater urgency of global health challenge, environmental issues might seem relatively trivial. Although there was a short-term reduction in pollution due to reduced economic activities and consumption during the early outbreak (He, Pan, & Tanaka, 2020), the reduction might not be able to offset the long-term negative consequences of massive production of personal protective equipment, increased consumption of single-used plastics,

and the overuse of chemical hygiene products in that lengthy duration of the pandemic (Patrício Silva et al., 2021; Sachs et al., 2020).

The positive effects of humanity self-construal and ecological self-construal on well-being evidenced in the present project raise the possibility that enhancing people's sense of connectedness with all humanity or all entities of nature might be a psychological remedy to the feelings of loneliness and social isolation during this pandemic era. In fact, amidst a time where social distancing has to be maintained and interpersonal contact is discouraged, some people have resorted to tree-hugging as a viable way to feel loved and connected (BBC News, 2000; Reuters, 2020). According to Hodges and Gore (2019), individuals normally prefer connecting with *strong ties* than with *weak ties*. *Strong ties* refer to people who are central to one's social network (e.g., family and friends), whereas *weak ties* refer to people who are socially peripheral (e.g., strangers) (Granovetter, 1973; Hodges & Gore, 2019; Sandstrom & Dunn, 2014). However, when individuals' need for connectedness cannot be fulfilled through traditional strong ties, then connecting with the weak ties becomes more important. Along this line of reasoning, it seems that the pandemic has created a rare opportunity for individuals to seek connectedness with humans and nature, as connecting with close others has suddenly become unavailable.

Inspired by the tree-hugging phenomenon and the findings of the present project, I propose the development of a web-based *Shinrin-Yoku* (forest-bathing) program, crafting a unique space for people from all around the world to reconnect with nature virtually, despite all social distancing measures and travel bans in the reality. Shinrin-Yoku is a therapeutic practice originated in Japan, where people immerse themselves in a forest to experience a sense of oneness with nature through their five senses (Kotera, Richardson, & Sheffield, 2020). Empirical evidence showed that Shinrin-Yoku is effective in reducing stress, anxiety,

and depressive symptoms, and in enhancing holistic well-being (Hansen, Jones, & Tocchini, 2017; Kotera et al., 2020), though its effectiveness in alleviating COVID-19-related psychological issues has yet to be tested (Timko Olson, Hansen, & Vermeesch, 2020). Traditionally, Shinrin-Yoku tends to focus on one's sense of connectedness with nature, without explicitly delineating whether humans, as a collective, are included in or excluded from the definition of nature. The web-based Shinrin-Yoku I proposed, however, will follow the conceptualization of ecological self-construal that emphasizes the notion that humans are part of the nature. The program can thus help strengthen people's sense of connectedness with all entities of nature, including humans. In other words, ecological self-construal will be enhanced. The findings of the present project have given us confidence that such enhanced ecological self-construal should be particularly beneficial to the formation of pro-environmental behavior. Moreover, the web-based nature of the program has the advantage of maintaining a virtual global community that transcends all geographic boundaries and brings people together from far and wide, irrespective of ethnicity, race, and nationality. Such inclusive virtual community can help deepen people's holistic sense of connectedness with all humanity. In other words, humanity self-construal will also be enhanced. With reference to the findings of the present project, such enhanced humanity self-construal is believed to be conducive to the formation of prosocial behavior.

Taken together, I believe that the proposed web-based Shinrin-Yoku program will be able to strengthen people's humanity self-construal and ecological self-construal, which in turn will improve their well-being and enhance their prosocial and pro-environmental behavior.

Limitations and Future Directions

Before concluding, several caveats to this project should be noted to inform the directions of future research.

First, due to the cross-sectional nature of the studies, temporal stability of the measures of HSC and ESC is not guaranteed, directional relationships between variables are solely based on theoretical assumption and inference from single time-point correlation. To address both measurement consistency and directionality issue, future research may consider using a longitudinal design to assess the stability of HSC and ESC across time through repeated sampling, and adopting the analytical strategy of cross-lagged panel analysis (Kearney, 2017) to examine the causal influences of HSC and ESC on the outcome variables while controlling for within time-points correlations.

Second, due to the self-report nature of the studies, data may be subject to social desirability, introspective ability, and recall biases. Future research may integrate self-report data with other objective measures to enhance the accuracy and interpretability of findings. For example, besides self-report data, actual prosocial and pro-environmental behaviors can be measured through *public goods games* (PGG) (Andreoni, 1988; Milinski, Semmann, Krambeck, & Marotzke, 2006; Van Hoorn, Van Dijk, Güroğlu, & Crone, 2016). Specifically, each participant is endowed with a small amount of money that the participant is free to allocate among him/herself, a humanitarian charity, and an environmental charity. The actual money donated can thus be used as an indicator of the actual prosocial or pro-environmental behaviors, respectively. Moreover, an ecological momentary assessment (EMA) protocol (Stone & Shiffman, 1994) can be adopted to measure both subjective and objective psychological outcomes. Specifically, electronic wearable devices can be used to collect heart rate variability (HRV) data in real-time and in natural environment, as an objective indicator

of psychological stress, while mobile apps can be used to send out electronic signals in preset time periods, prompting participants to report current thoughts and mood via self-administered online questionnaires (Shiffman, Stone, & Hufford, 2008). The integrated data can help detect the agreement or disagreement between objective and subjective data and thus improve the accuracy and credibility of the research findings.

Third, although this project has discriminated HSC and ESC as two distinct constructs and has demonstrated their differential effects on various well-being, prosocial, and pro-environmental indicators, some basic attributes of self-construal, such as the ability to be temporarily activated through priming (Cross et al., 2011; Oyserman & Lee, 2008), remain unexamined. Besides traditional self-construal priming techniques such as *similarities and differences with family and friends task* (SDFF) and *Sumerian warrior story* (Trafimow, Triandis, & Goto, 1991) that require participants to engage in certain thinking and reading tasks, future research may also incorporate advanced digital technology and neuroimaging techniques to examine the properties of HSC and ESC in an priming experiment. Specifically, to maximize ecological realism, immersive virtual environment (IVE) (Blascovich et al., 2002) can be used as a priming tool to create a virtual spatial experience for participants to be perceptually surrounded by a human environment composed of people of different races, ethnicities, genders, and ages (HSC-prime condition), or a natural environment made up of human and nonhuman natural entities (ESC-prime condition). Subsequently, fMRI can be used as a manipulation check to see whether HSC-primed and ESC-primed participants would activate the same or different brain regions (ventral medial prefrontal cortex) when they are presented with images of self, nonhuman natural entities, or humans (Ng, Han, Mao, & Lai, 2010).

Lastly, limited by the scope of the project, the investigation of the effects of humanity self-construal and ecological self-construal only focused on the local context of Hong Kong, while their effects in other cultural contexts remain untested. Future research should extend the investigation to cross-cultural contexts to examine the role of culture in the linkages between self-expansion and well-being, prosociality, and environmentalism.

Conclusion

To conclude, the present project demonstrated that humanity self-construal and ecological self-construal are two distinct constructs among university student and community adult samples, and across local and cross-cultural contexts, providing empirical support for the potential applicability of the research tools in wider contexts. The converging findings among two local samples have led initial support for the differential effects of humanity self-construal and ecological self-construal on well-being, prosociality, and environmentalism.

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Table 1

Items Used in the Development of Humanity Self-Construal Scale and Ecological Self-Construal Scale in Study 1

Item No.	Humanity Self-Construal Item	Ecological Self-Construal Item	Original Item	Adapted from
1	I control my behavior to accommodate the wishes (interests) of all humanity	I control my behavior to accommodate the wishes (interests) of all entities of nature, including humans	I control my behavior to accommodate the wishes (interests) of all humanity	Sixfold Self-Construal Scale (Harb & Smith, 2008)
2	I feel I have a strong relationship with all humanity	I feel I have a strong relationship with all entities of nature, including humans	I feel I have a strong relationship with all humanity	Sixfold Self-Construal Scale (Harb & Smith, 2008)
3	I would teach my children to be caring to everyone in humankind and attentive to their needs	I would teach my children to be caring to everything in all entities of nature, including humans, and attentive to their needs	I would teach my children - To be loyal to the group to which they belong	Relational, Individual, and Collective self-aspects Scale (RIC Scale; E. S. Kashima & Hardie, 2000)
4	The most satisfying activity for me is doing something for all humanity	The most satisfying activity for me is doing something for all entities of nature, including humans	The most satisfying activity for me is - Doing something for my group (e.g., my school, church, club, neighborhood, and community)	Relational, Individual, and Collective self-aspects Scale (RIC Scale; E. S. Kashima & Hardie, 2000)
5	I am very concerned about all humanity's future	I am very concerned about the future of all entities of nature, including humans	I am very concerned about (my group's) future	Brief Relational, Individual, and Collective self-aspects Scale (Brief RIC Scale; Hardie, 2009)
6	I will sacrifice my self-interest for the benefit of all humanity	I will sacrifice my self-interest for the benefit of all entities of nature, including humans	I will sacrifice my self-interest for the group I am in	Self-Construal Scale (SCS; Singelis, 1994)
7	It is important for me to maintain harmony with all humanity	It is important for me to maintain harmony with all entities of nature, including humans	It is important for me to maintain harmony within my group	Self-Construal Scale (SCS; Singelis, 1994)
8	My relationship to all humanity is an important part of who I am	My relationship to all entities of nature, including humans, is an important part of who I am	My relationship to nature is an important part of who I am	Nature Relatedness Scale (NR-6; Nisbet & Zelenski, 2013)
9	I feel very connected to all humanity.	I feel very connected to all entities of nature, including humans	I feel very connected to all living things and the earth	Nature Relatedness Scale (NR-6; Nisbet & Zelenski, 2013)
10	I often feel a sense of oneness with all humanity	I often feel a sense of oneness with all entities of nature, including humans	I often feel a sense of oneness with the natural world around me	Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004)

Table 2

Factor Loadings of the Pooled Items for the Humanity Self-Construal Scale and Ecological Self-Construal Scale in Study 1 (N = 330)

Item	Factor 1	Factor 2
E-item 1. I control my behavior to accommodate the interests of all entities of nature, including humans.	.71	
E-item 2. I feel I have a strong relationship with all entities of nature, including humans.	.82	
E-item 3. I would teach my children to be caring to everything in all entities of nature, including humans, and attentive to their needs.	.88	
E-item 4. I am very concerned about the future of all entities of nature, including humans.	.89	
E-item 5. It is important for me to maintain harmony with all entities of nature, including humans.	.74	
E-item 6. My relationship to all entities of nature, including humans, is an important part of who I am.	.65	
E-item 7. I feel very connected to all entities of nature, including humans.	.87	
H-item 1. I feel I have a strong relationship with all humanity.		.65
H-item 2. The most satisfying activity for me is doing something for all humanity.		.77
H-item 3. I will sacrifice my self-interest for the benefit of all humanity.		.75
H-item 4. My relationship to all humanity is an important part of who I am.		.80
H-item 5. I feel very connected to all humanity.		.64
H-item 6. I often feel a sense of oneness with all humanity.		.89

Note. Factor 1 = Ecological self-construal; Factor 2 = Humanity self-construal. Factor loadings below .60 are not shown.

Table 3

Means, Standard Deviations, and Intercorrelations among the Measures in Study 1 (N = 330)

Variable	Mean	*SD*	1	2	3	4	5	6	7	8	9	10	11
1. HSC	4.46	0.97	-										
2. ESC	5.21	0.88	.62**	-									
3. CN	3.54	0.47	.48**	.75**	-								
4. EID	4.74	1.02	.51**	.68**	.71**	-							
5. NEP	3.82	0.47	.05	.37**	.35**	.24**	-						
6. IS	5.65	0.60	.28**	.29**	.27**	.21**	.15**	-					
7. RS	5.50	0.62	.35**	.34**	.24**	.24**	.13*	.54**	-				
8. CS	5.20	0.71	.44**	.37**	.24**	.27**	.02	.39**	.71**	-			
9. IWC	2.98	0.75	.36**	.17**	.14**	.17**	-.11	.15**	.25**	.41**	-		
10. IWS	3.26	0.60	.42**	.29**	.17**	.17**	-.02	.15**	.23**	.35**	.55**	-	
11. IWAH	2.66	0.60	.61**	.49**	.41**	.41**	.04	.26**	.27**	.33**	.37**	.53**	-

Note. HSC = Humanity self-construal; ESC = Ecological self-construal; CN = Connectedness to nature; EID = Environmental identity; NEP = New ecological paradigm; IS = Individual self; RS = Relational self; CS = Collective self; IWC = Identification with community; IWS = Identification with society; IWAH = Identification with all humanity.

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

Table 4

Means, Standard Deviations, and Intercorrelations among the Measures in Study 2 (N = 321)

Variable	Mean	SD	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1. HSC	4.25	1.06	-																	
2. ESC	5.18	0.87	.67**	-																
3. ECO	3.94	0.46	.39**	.61**	-															
4. ANT	2.97	0.51	.27**	.09	.02	-														
5. APA	2.12	0.54	-.12*	-.43*	-.53*	.33**	-													
6. IWAH	2.62	0.64	.64**	.54**	.37**	.10	-.19*	-												
7. CN	3.50	0.52	.50**	.65**	.64**	.10	-.40*	.41**	-											
8. IS	5.62	0.59	.19**	.25**	.25**	.01	-.18*	.21**	.21**	-										
9. RS	5.52	0.57	.24**	.26**	.19**	.06	-.14*	.27**	.15**	.52**	-									
10. CS	5.16	0.66	.49**	.42**	.21**	.16**	-.11	.33**	.26**	.42**	.65**	-								
11. EWB	4.22	1.02	.16**	.22**	.08	.09	-.06	.12*	.13*	.36**	.31**	.33**	-							
12. PWB	4.03	0.97	.20**	.28**	.15**	.03	-.12*	.21**	.24**	.42**	.40**	.42**	.78**	-						
13. SWB	3.13	1.06	.44**	.30**	.11*	.23**	-.04	.29**	.23**	.27**	.34**	.50**	.52**	.64**	-					
14. OWB	3.75	0.89	.32**	.31**	.14*	.13*	-.09	.25**	.24**	.40**	.41**	.49**	.83**	.93**	.85**	-				
15. EC	3.52	0.57	.28**	.31**	.30**	-.11	-.19*	.19**	.25**	.17**	.25**	.32**	.12*	.19**	.22**	.21**	-			
16. PSBI	3.45	0.76	.36**	.33**	.30**	-.00	-.17*	.31**	.31**	.05	.25**	.34**	.15**	.24**	.39**	.31**	.34**	-		
17. PEA	4.52	0.56	.33**	.55**	.64**	-.08	-.65*	.30**	.54**	.27**	.21**	.28**	.16**	.21**	.17**	.21**	.25**	.33**	-	
18. PEBI	3.06	0.61	.49**	.47**	.42**	.17**	-.28*	.42**	.52**	.06	.13*	.32**	.11	.20**	.39**	.28**	.24**	.52**	.51**	-

Note. HSC = Humanity self-construal; ESC = Ecological self-construal; ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; IWAH = Identification with all humanity; CN = Connectedness to Nature; IS = Individual self; RS = Relational self; CS = Collective self; EWB = Emotional well-being; PWB = Psychological well-being; SWB = Social well-being; OWB = Overall well-being; EC = Empathic concern; PSBI = Prosocial behavioral intention; PEA = Pro-Environmental attitude; PEBI = Pro-Environmental behavioral intention.

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

Table 5

Hierarchical Regression Models for Predicting Well-Being in Study 2 (N = 321)

Variable	Emotional Well-Being		Psychological Well-Being		Social Well-Being		Overall Well-Being	
	β 1	β 2	β 1	β 2	β 1	β 2	β 1	β 2
Age	.02	.03	.09	.10	-.01	.01	.04	.06
Gender (1 = male, 0 = female)	-.04	-.02	-.04	-.01	-.10	-.08	-.07	-.04
Humanity self-construal		.02		.03		.45***		.21**
Ecological self-construal		.20**		.27***		-.01		.17*
R^2	.00	.04	.00	.08	.00	.19	.00	.11
ΔR^2	.00	.05	.01	.08	.01	.19	.01	.12
ΔF	0.27	7.90***	1.27	14.13***	1.58	38.31***	0.89	21.58***

Note. β 1 = Block 1 beta; β 2 = Block 2 beta.

*p < .05. **p < .01. ***p < .001.

Table 6

Hierarchical Regression Models for Predicting Prosocial and Pro-Environmental Attitudes and Behavioral Intentions in Study 2 (N = 321)

Variable	Empathic Concern		Prosocial Behavioral Intention		Pro-Environmental Attitude		Pro-Environmental Behavioral Intention	
	β 1	β 2	β 1	β 2	β 1	β 2	β 1	β 2
Age	-.04	-.02	.00	.02	.08	.11*	.03	.06
Gender (1 = male, 0 = female)	-.10	-.07	-.17**	-.15**	-.09	-.03	.00	.04
HSC		.14*		.26***		-.05		.32***
ESC		.20**		.14*		.59***		.26***
R^2	.01	.10	.02	.15	.01	.31	-.01	.27
ΔR^2	.01	.10	.03	.14	.01	.30	.00	.28
ΔF	1.94	17.65***	4.81**	25.63***	2.01	69.61***	0.15	61.01***

Note. HSC = Humanity self-construal; ESC = Ecological self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta.

*$p < .05$. **$p < .01$. ***$p < .001$.

Table 7

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Well-Being (Controlling for Human-Nature Orientations) in Study 2 (N = 321)

Variable	Emotional Well-Being				Psychological Well-Being				Social Well-Being				Overall Well-Being			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	.02	.03	.05	.05	.09	.09	.11	.11	-.01	.01	.03	.03	.04	.05	.08	.07
Gender (1 = male, 0 = female)	-.04	-.04	-.02	-.02	-.04	-.03	-.01	-.01	-.10	-.11*	-.09	-.09	-.07	-.07	-.05	-.05
ECO		.03	-.10	-.10		.10	-.05	-.05		.06	-.10	-.12		.08	-.09	-.10
ANT		.12*	.08	.08		.07	.02	.01		.26***	.21***	.15**		.17**	.12*	.09
APA		-.08	-.02	-.02		-.08	-.01	-.02		-.08	-.01	-.07		-.09	-.01	-.04
ESC			.26***	.26**			.31***	.29***			.33***	.05			.35***	.22*
HSC				-.01				.03				.41***				.19*
R^2	.00	.00	.04	.04	.00	.02	.07	.07	.00	.07	.13	.21	.00	.03	.10	.12
ΔR^2	.00	.02	.04	.00	.01	.03	.06	.00	.01	.07	.06	.08	.01	.04	.07	.02
ΔF	0.27	1.99	13.17***	0.00	1.27	2.92*	19.21***	0.15	1.58	8.09***	22.82***	33.46***	0.89	4.71**	24.97***	6.24*

Note. ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; ESC = Ecological self-construal; HSC = Humanity self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 8

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Prosocial and Pro-Environmental Attitudes and Behavioral Intentions (Controlling for Human-Nature Orientations) in Study 2 (N = 321)

Variable	Empathic Concern				Prosocial Behavioral Intention				Pro-Environmental Attitude				Pro-Environmental Behavioral Intention			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	-.04	-.06	-.04	-.05	-.00	-.01	.00	.00	.08	.06	.07	.07	.03	.04	.06	.05
Gender (1 = male, 0 = female)	-.10	-.08	-.06	-.06	-.17**	-.16**	-.14**	-.14**	-.09	-.03	-.01	-.01	.00	.01	.03	.03
ECO		.31***	.20**	.19**		.29***	.17*	.16*		.39***	.31***	.30***		.31***	.16*	.15*
ANT		-.12*	-.15**	-.19**		.01	-.03	-.08		.08	.05	.04		.22***	.18**	.12*
APA		.02	.06	.03		.00	.05	.00		-.46***	-.42***	-.43***		-.19**	-.12	-.17**
ESC			.22**	.07			.23***	.03			.18***	.12*			.31***	.08
HSC				.21**				.29***				.07				.33***
R^2	.01	.10	.12	.14	.02	.10	.13	.17	.01	.54	.56	.56	-.01	.21	.26	.31
ΔR^2	.01	.10	.03	.02	.03	.08	.03	.04	.01	.54	.02	.00	.00	.22	.05	.05
ΔF	1.94	11.81***	9.89**	8.22**	4.81**	9.82***	11.55***	16.24***	2.01	125.91***	13.16***	2.05	0.15	29.37***	23.58***	25.18***

Note. ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; ESC = Ecological self-construal; HSC = Humanity self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 9

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Well-Being (Controlling for Human-Nature Orientations) in Study 2 (N = 321)

Variable	Emotional Well-Being				Psychological Well-Being				Social Well-Being				Overall Well-Being			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	.02	.03	.03	.05	.09	.09	.09	.11	-.01	.01	.02	.03	.04	.05	.06	.07
Gender (1 = male, 0 = female)	-.04	-.04	-.03	-.02	-.04	-.03	-.02	-.01	-.10	-.11*	-.09	-.09	-.07	-.07	-.06	-.05
ECO		.03	-.02	-.10		.10	.03	-.05		.06	-.10	-.12		.08	-.03	-.10
ANT		.12*	.09	.08		.07	.02	.01		.26***	.15**	.15**		.17**	.09	.09
APA		-.08	-.08	-.02		-.08	-.08	-.02		-.08	-.08	-.07		-.09	-.09	-.04
HSC			.13*	-.01			.18**	.03			.43***	.41***			.30***	.19*
ESC				.26**				.29**				.05				.22*
R^2	.00	.00	.02	.04	.00	.02	.04	.07	.00	.07	.21	.21	.00	.03	.10	.12
ΔR^2	.00	.02	.01	.03	.01	.03	.02	.03	.01	.07	.14	.00	.01	.04	.07	.02
ΔF	0.27	1.99	4.36*	8.67**	1.27	2.92*	8.35**	10.71**	1.58	8.09***	58.46***	0.31	.89	4.71**	24.73***	6.47*

Note. ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; HSC = Humanity self-construal; ESC = Ecological self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 10

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Prosocial and Pro-Environmental Attitudes and Behavioral Intentions (Controlling for Human-Nature Orientations) in Study 2 (N = 321)

Variable	Empathic Concern				Prosocial Behavioral Intention				Pro-Environmental Attitude				Pro-Environmental Behavioral Intention			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	-.04	-.06	-.05	-.05	.00	-.01	.00	.00	.08	.06	.06	.07	.03	.04	.05	.05
Gender (1 = male, 0 = female)	-.10	-.08	-.06	-.06	-.17**	-.16**	-.14**	-.14**	-.09	-.03	-.02	-.01	.00	.01	.03	.03
ECO		.31***	.21**	.19**		.29***	.17*	.16*		.39***	.34***	.30***		.31***	.17**	.15*
ANT		-.12*	-.18**	-.19**		.01	-.08	-.08		.08	.04	.04		.22***	.13*	.12*
APA		.02	.02	.03		.00	-.01	.00		-.46***	-.46***	-.43***		-.19**	-.19**	-.17**
HSC			.25***	.21**			.31***	.29***			.14**	.07			.37***	.33***
ESC				.07				.03				.12*				.08
R^2	.01	.10	.14	.14	.02	.10	.17	.17	.01	.54	.56	.56	-.01	.21	.31	.31
ΔR^2	.01	.10	.05	.00	.03	.08	.07	.00	.01	.54	.02	.01	.00	.22	.11	.00
ΔF	1.94	11.81***	17.67***	0.69	4.81**	9.82***	28.29***	0.14	2.01	125.91***	10.91***	4.23*	0.15	29.37***	49.49***	1.07

Note. ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; HSC = Humanity self-construal; ESC = Ecological self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 11

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Well-Being (Controlling for IWAH) in Study 2 (N = 321)

Variable	Emotional Well-Being			Psychological Well-Being			Social Well-Being			Overall Well-Being		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	.02	.02	.03	.09	.09	.09	-.01	-.01	.01	.04	.04	.05
Gender (1 = male, 0 = female)	-.04	-.04	-.03	-.04	-.03	-.03	-.10†	-.09†	-.08	-.07	-.06	-.05
IWAH		.12*	.04		.21***	.12†		.29***	.01		.25***	.07
HSC			.13†			.13†			.43***			.28***
R^2	.00	.02	.03	.01	.05	.06	.01	.09	.20	.01	.07	.11
ΔR^2	.00	.02	.01	.01	.04	.01	.01	.08	.11	.01	.06	.04
ΔF	.27	4.96*	3.27†	1.27	14.08***	3.23†	1.58	28.60***	44.13***	.89	20.89***	16.01***

Note. IWAH = Identification with all humanity; HSC = Humanity self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 12

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Prosocial and Pro-Environmental Attitudes and Behavioral Intentions (Controlling for IWAH) in Study 2 (N = 321)

Variable	Empathic Concern			Prosocial Behavioral Intention			Pro-Environmental Attitude			Pro-Environmental Behavioral Intention		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	-.04	-.04	-.02	.00	.00	.01	.08	.08	.09†	.03	.03	.05
Gender (1 = male, 0 = female)	-.10†	-.10†	-.09	-.17**	-.17**	-.16**	-.09	-.08	-.07	.00	.00	.02
IWAH		.19*	.02		.31***	.14*		.30***	.15*		.42***	.18**
HSC			.27***			.26***			.24***			.37***
R^2	.01	.05	.09	.03	.12	.16	.01	.10	.14	.00	.18	.26
ΔR^2	.01	.03	.04	.03	.09	.04	.01	.09	.03	.00	.18	.08
ΔF	1.94	11.57***	14.64***	4.81**	34.21***	15.52***	2.01	32.02***	12.52***	.15	68.57***	35.40***

Note. IWAH = Identification with all humanity; HSC = Humanity self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 13

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Prosocial and Pro-Environmental Attitudes and Behavioral Intentions (Controlling for Connectedness to Nature) in Study 2 (N = 321)

Variable	Emotional Well-Being			Psychological Well-Being			Social Well-Being			Overall Well-Being		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	.02	.03	.03	.09	.09†	.10†	-.01	.00	.01	.04	.05	.06
Gender (1 = male, 0 = female)	-.04	-.04	-.01	-.04	-.03	-.01	-.10†	-.09†	-.07	-.07	-.06	-.04
CN		.13*	-.02		.24***	.10		.22***	.06		.24***	.07
ESC			.23**			.22**			.25***			.27***
R^2	.00	.02	.05	.01	.07	.09	.01	.06	.10	.01	.06	.10
ΔR^2	.00	.02	.03	.01	.06	.03	.01	.05	.04	.01	.06	.04
ΔF	.27	5.24*	10.42**	1.27	19.92***	9.81**	1.58	16.71***	12.43***	.89	19.30***	14.35***

Note. CN = Connectedness to Nature; ESC = Ecological self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta.

$^{\dagger}p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 14

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Well-Being (Controlling for Connectedness to Nature) in Study 2 (N = 321)

Variable	Empathic Concern			Prosocial Behavioral Intention			Pro-Environmental Attitude			Pro-Environmental Behavioral Intention		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	-.04	-.04	-.02	.00	.00	.01	.08	.10*	.11*	.03	.05	.06
Gender (1 = male, 0 = female)	-.10†	-.10†	-.07	-.17**	-.17**	-.15**	-.09	-.08†	-.05	.00	.01	.03
CN		.25***	.10		.31***	.18*		.54***	.32***		.53***	.38***
ESC			.23**			.20**			.34***			.23***
R^2	.01	.07	.11	.03	.12	.15	.01	.31	.37	.00	.28	.31
ΔR^2	.01	.06	.03	.03	.09	.02	.01	.29	.07	.00	.28	.03
ΔF	1.94	21.39***	10.97**	4.81**	33.61***	8.64**	2.01	135.02***	33.73***	.15	121.16***	13.49***

Note. CN = Connectedness to Nature; ESC = Ecological self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 15

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Well-Being (Controlling for RIC) in Study 2 (N = 321)

Variable	Emotional Well-Being			Psychological Well-Being			Social Well-Being			Overall Well-Being		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	.02	.01	.01	.09	.08	.08	-.01	.00	.01	.04	.04	.04
Gender (1 = male, 0 = female)	-.04	.00	.00	-.04	.01	.01	-.10	-.04	-.04	-.07	-.01	-.01
IS		.26***	.26***		.25***	.25***		.07	.06		.21***	.21***
RS		.05	.05		.10	.10		.00	.04		.06	.07
CS		.20**	.19*		.25***	.24***		.47***	.32***		.37***	.30***
HSC			.00			.02			.27***			.12*
R^2	.00	.17	.17	.01	.26	.26	.01	.26	.31	.01	.29	.30
ΔR^2	.00	.17	.00	.01	.25	.00	.01	.25	.05	.01	.28	.01
ΔF	.27	21.68***	.00	1.27	34.98***	.09	1.58	34.88***	24.41***	.89	41.42***	5.00*

Note. IS = Individual self; RS = Relational self; CS = Collective self; HSC = Humanity self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta.

*p < .05. **p < .01. ***p < .001.

Table 16

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Prosocial and Pro-Environmental Attitudes and Behavioral Intentions (Controlling for RIC) in Study 2 (N = 321)

Variable	Empathic Concern			Prosocial Behavioral Intention			Pro-Environmental Attitude			Pro-Environmental Behavioral Intention		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	-.04	-.03	-.03	.00	.01	.02	.08	.08	.08	.03	.05	.06
Gender (1 = male, 0 = female)	-.10	-.06	-.06	-.17**	-.12*	-.13*	-.09	-.06	-.06	.00	.04	.03
IS		.03	.03		-.14*	-.15*		.20**	.19**		-.06	-.07
RS		.05	.07		.11	.15*		-.04	.00		-.12	-.06
CS		.27***	.17*		.31***	.16*		.22**	.07		.43***	.19**
HSC			.17**			.27***			.27***			.43***
R^2	.01	.11	.13	.03	.15	.20	.01	.12	.17	.00	.12	.26
ΔR^2	.01	.10	.02	.03	.12	.06	.01	.10	.05	.00	.12	.14
ΔF	1.94	11.72***	8.25**	4.81**	14.51***	21.74***	2.01	12.36***	20.32***	.15	14.42***	58.57***

Note. IS = Individual self; RS = Relational self; CS = Collective self; HSC = Humanity self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta.

*p < .05. **p < .01. ***p < .001.

Table 17

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Well-Being (Controlling for RIC) in Study 2 (N = 321)

Variable	Emotional Well-Being			Psychological Well-Being			Social Well-Being			Overall Well-Being		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	.02	.01	.02	.09	.08	.08†	-.01	.00	.00	.04	.04	.04
Gender (1 = male, 0 = female)	-.04	.00	.00	-.04	.01	.02	-.10†	-.04	-.03	-.07	-.01	-.01
IS		.26***	.25***		.25***	.24***		.07	.05		.21***	.19***
RS		.05	.05		.10	.11		.00	.01		.06	.07
CS		.20**	.16*		.25***	.20**		.47***	.43***		.37***	.32***
ESC			.08			.12*			.10†			.12*
R^2	.00	.17	.18	.01	.26	.27	.01	.26	.26	.01	.29	.30
ΔR^2	.00	.17	.00	.01	.25	.01	.01	.25	.01	.01	.28	.01
ΔF	.27	21.68***	1.85	1.27	34.98***	4.71*	1.58	34.88***	3.44†	.89	41.42***	4.85*

Note. IS = Individual self; RS = Relational self; CS = Collective self; ESC = Ecological self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta.

†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 18

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Prosocial and Pro-Environmental Attitudes and Behavioral Intentions (Controlling for RIC) in Study 2 (N = 321)

Variable	Empathic Concern			Prosocial Behavioral Intention			Pro-Environmental Attitude			Pro-Environmental Behavioral Intention		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	-.04	-.03	-.02	.00	.01	.02	.08	.08	.10*	.03	.05	.07
Gender (1 = male, 0 = female)	-.10	-.06	-.05	-.17**	-.12*	-.11*	-.09	-.06	-.03	.00	.04	.06
IS		.03	.01		-.14*	-.17**		.20**	.14*		-.06	-.11
RS		.05	.07		.11	.14		-.04	.01		-.12	-.08
CS		.27***	.18*		.31***	.21**		.22**	.00		.43***	.26***
ESC			.21***			.24***			.52***			.42***
R^2	.01	.11	.15	.03	.15	.19	.01	.12	.33	.00	.12	.26
ΔR^2	.01	.10	.03	.03	.12	.05	.01	.10	.21	.00	.12	.14
ΔF	1.94	11.72***	12.65***	4.81**	14.51***	18.53***	2.01	12.36***	100.87***	.15	14.42***	59.60***

Note. IS = Individual self; RS = Relational self; CS = Collective self; ESC = Ecological self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta.

*p < .05. **p < .01. ***p < .001.

Table 19

Single-Group Analysis: Modifications and Global Fit in Study 3 (N = 421)

Group	*Modification*	*CFI*	*TLI*	*RMSEA*	*SRMR*
1. Environmental Affiliates	e4 < -- > e6	.981	.959	.084	.042
2. Humanitarian Affiliates	e5 < -- > e3	.991	.981	.075	.024
3. Non-Affiliates		.982	.966	.092	.024

Table 20

MGCFA: Fit Measures of the Invariance test in Study 3 (N = 421)

Model	*CFI*	*TLI*	*RMSEA*	*SRMR*
1. Configural Invariance	.976	.954	.060	.057
2. Metric Invariance	.972	.960	.056	.050
3. Partial Scalar Invariance	.948	.941	.069	.062

Table 21

Means, Standard Deviations, and Intercorrelations among the Measures in Study 3 (N = 421)

Variable	Mean	*SD*	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
1. HSC	4.90	1.05	-															
2. ESC	5.77	0.79	.67**	-														
3. ECO	4.18	0.43	.30**	.49**	-													
4. ANT	2.90	0.59	.02	-.04	-.04	-												
5. APA	1.88	0.53	-.20**	-.36**	-.48*	.39**	-											
6. EWB	3.99	1.18	.28**	.20**	.02	.09	.03	-										
7. PWB	4.03	1.06	.25**	.25**	.06	.06	.00	.79**	-									
8. SWB	3.01	1.06	.28**	.23**	.05	.20**	.10*	.61**	.68**	-								
9. OWB	3.68	0.98	.30**	.25**	.05	.13**	.05	.91**	.92**	.85**	-							
10. PSB	3.04	0.70	.31**	.29**	.30**	-.02	-.14**	.22**	.34**	.33**	.33**	-						
11. PEB	3.54	0.75	.30**	.40**	.39**	-.09	-.38**	.17**	.24**	.23**	.24**	.46**	-					
12. CEL	1.35	0.75	-.02	-.11*	-.07	.12*	.15**	-.04	-.04	-.07	-.06	-.04	-.16**	-				
13. CET	2.23	2.40	.02	.07	.09	-.03	-.02	-.00	.01	-.00	.00	.02	.08	.10*	-			
14. CEF	1.99	0.41	-.15**	-.17**	-.12*	.01	.08	-.09	-.09	-.12*	-.11*	-.17**	-.22**	.08	-.05	-		
15. CEC	0.22	0.24	.07	.01	-.05	.13**	.06	.00	.02	-.01	.01	-.10*	-.11*	.14**	.12*	-.01	-	
16. CETOT	5.77	2.67	-.00	.01	.05	.02	.03	-.04	-.02	-.05	-.04	-.02	-.02	.40**	.94**	.13**	.24**	-

Note. HSC = Humanity self-construal; ESC = Ecological self-construal; ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; EWB = Emotional well-being; PWB = Psychological well-being; SWB = Social well-being; OPMH = Overall well-being; PSB = Prosocial behavior; PEB = Pro-Environmental behavior; CEL = Carbon emission by living; CET = Carbon emission by travel; CEF = Carbon emission by food; CEC = Carbon emission by clothing; CETOT = Total carbon emission.
*$p < .05$. **$p < .01$.

Table 22

Means and Standard Deviations among Measures as a Function of Group (Controlling for Demographics) in Study 3 (N = 421)

Variable	Environmental Affiliates (n = 117)		Humanitarian Affiliates (n = 110)		Non-Affiliates (n = 194)	
	Mean	*SD*	Mean	*SD*	Mean	*SD*
Humanity self-construal	5.21[a]	0.92	4.87[b]	1.07	4.75[b]	1.07
Ecological self-construal	6.13[a]	0.56	5.72[b]	0.84	5.58[b]	0.81
Well-being						
Emotional well-being	4.07[a]	1.14	4.13[a]	1.15	3.84[a]	1.22
Psychological well-being	4.06[a]	1.02	4.18[a]	1.01	3.88[a]	1.10
Social well-being	3.24[a]	1.02	3.21[a]	1.02	2.73[b]	1.05
Overall well-being	3.79[a]	0.97	3.84[a]	0.93	3.48[b]	0.99
Prosocial behavior	3.22[a]	0.77	3.18[a]	0.62	2.87[b]	0.67
Pro-environmental behavior	3.95[a]	0.57	3.49[b]	0.78	3.31[b]	0.74
Carbon emission (tons per year)						
Carbon emission by living	1.12[a]	0.51	1.43[b]	0.64	1.44[b]	0.88
Carbon emission by travel	2.25[a]	1.91	2.49[a]	2.38	2.12[a]	2.66
Carbon emission by food	1.86[a]	0.39	2.04[b]	0.45	2.04[b]	0.39
Carbon emission by clothing	0.16[a]	0.20	0.25[b]	0.24	0.24[b]	0.25
Total carbon emission	5.39[a]	1.97	6.21[a]	2.55	5.85[a]	3.02

Note. Means within the same row that do not share subscripts are significantly different ($p < .05$).

Table 23

Hierarchical Regression Models for Predicting Well-Being in Study 3 (N = 421)

Variable	Emotional Well-Being		Psychological Well-Being		Social Well-Being		Overall Well-Being	
	β 1	β 2	β 1	β 2	β 1	β 2	β 1	β 2
Age	.27***	.23***	.24***	.20***	.11*	.07	.23***	.19***
Gender (1 = male, 0 = female)	-.01	-.01	.01	.02	.01	.02	.00	.01
Education	.12*	.10*	.06	.03	.06	.03	.09	.06
Income	-.01	.01	-.01	.01	-.02	.00	-.01	.01
Humanity self-construal		.24***		.13*		.21**		.22***
Ecological self-construal		.01		.15*		.08		.09
R^2	.06	.11	.04	.10	.00	.07	.04	.12
ΔR^2	.07	.06	.05	.06	.01	.07	.05	.08
ΔF	7.77***	13.51***	5.80***	14.71***	1.35	16.19***	5.69***	18.46***

Note. β 1 = Block 1 beta; β 2 = Block 2 beta.

*p < .05. **p < .01. ***p < .001.

Table 24

Hierarchical Regression Models for Predicting Prosocial and Pro-Environmental Behaviors in Study 3 (N = 421)

Variable	Prosocial Behavior		Pro-Environmental Behavior	
	β 1	β 2	β 1	β 2
Age	.21***	.16**	.16**	.11*
Gender (1 = male, 0 = female)	-.02	.00	-.12*	-.08
Education	-.01	-.05	.11*	.06
Income	.03	.05	.06	.09
Humanity self-construal		.17**		.04
Ecological self-construal		.18**		.36***
R^2	.03	.13	.04	.18
ΔR^2	.04	.10	.05	.14
ΔF	4.78***	24.34***	5.63***	36.89***

Note. β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta.

*p < .05. **p < .01. ***p < .001.

Table 25

Hierarchical Regression Models for Predicting Carbon Emission in Study 3 (N = 421)

Variable	Carbon Emission by Living		Carbon Emission by Travel		Carbon Emission by Food		Carbon Emission by Clothing		Total Carbon Emission	
	β 1	β 2	β 1	β 2	β 1	β 2	β 1	β 2	β 1	β 2
Age	.00	.00	.08	.08	-.25***	-.22***	-.08	-.09	.03	.03
Gender (1 = male, 0 = female)	.13**	.11*	-.07	-.06	.13**	.12*	-.02	-.03	-.01	-.01
Education	-.13*	-.12*	.11*	.10	.01	.03	.02	.02	.06	.06
Income	.30***	.29***	.25***	.25***	.07	.06	.13*	.13*	.33***	.33***
HSC		.09		-.04		-.04		.13*		-.01
ESC		-.14*		.08		-.13*		-.07		.01
R^2	.09	.10	.10	.09	.07	.09	.02	.02	.12	.12
ΔR^2	.10	.01	.10	.00	.08	.02	.03	.01	.13	.00
ΔF	11.07***	2.33	11.77***	0.85	8.37***	5.36**	2.79*	2.02	15.28***	.01

Note. HSC = Humanity self-construal; ESC = Ecological self-construal; β 1= Block 1 beta; β 2= Block 2 beta.

*p < .05. **p < .01. ***p < .001.

Table 26

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Well-Being and Prosocial Behavior (Controlling for Group Differences) in Study 3 (N = 421)

Variable	Social Well-Being			Overall Well-Being			Prosocial Behavior		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	.11*	.09	.06	.23***	.22***	.18***	.21***	.18***	.14**
Gender (1 = male, 0 = female)	.01	.03	.03	.00	.01	.01	-.02	.00	.00
Education	.06	.02	.00	.09	.07	.05	-.01	-.05	-.07
Income	-.02	-.01	.00	-.01	-.01	.00	.03	.04	.05
Dum_N1		.22***	.17***		.13*	.08		.22***	.17***
Dum_N2		.19***	.18***		.14**	.13**		.18***	.17***
HSC			.24***			.27***			.27***
R^2	.01	.06	.12	.05	.07	.14	.04	.10	.16
ΔR^2	.01	.05	.05	.05	.02	.07	.04	.05	.07
ΔF	1.35	11.33***	25.62***	5.69***	4.89**	31.98***	4.78***	11.83***	33.37***

Note. Dum_N1 = Group difference between Non-affiliates and Environmental affiliates; Dum_N2 = Group difference between Non-affiliates and Humanitarian affiliates; HSC = Humanity self-construal; β 1= Block 1 beta; β 2= Block 2 beta; β 3 = Block 3 beta. *$p < .05$. **$p < .01$. ***$p < .001$.

Table 27

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Pro-Environmental Variables (Controlling for Group Differences) in Study 3 (N = 421)

Variable	Pro-Environmental Behavior			Carbon Emission by Living			Carbon Emission by Food			Carbon Emission by Clothing		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	.16**	.14**	.11*	.00	.00	.00	-.25***	-.24***	-.23***	-.08	-.08	-.09†
Gender (1 = male, 0 = female)	-.12*	-.08†	-.08†	.13**	.11*	.11*	.13**	.11*	.12*	-.02	-.04	-.05
Education	.11*	.05	.04	-.13*	-.11*	-.11*	.01	.04	.04	.02	.04	.04
Income	.06	.08†	.09†	.30***	.29***	.29***	.07	.06	.06	.13*	.12*	.12*
Dum_E1		-.27***	-.24***		.14*	.15**		.19***	.17**		.17**	.19**
Dum_E2		-.41***	-.36***		.18**	.18**		.21***	.19**		.18**	.21***
HSC			.23***			.03			-.09†			.12*
R^2	.05	.17	.21	.10	.12	.12	.08	.11	.12	.03	.06	.07
ΔR^2	.05	.11	.05	.10	.02	.00	.08	.03	.01	.03	.03	.01
ΔF	5.63***	27.99***	25.17***	11.07***	5.42**	.32	8.37***	7.77***	3.62†	2.79*	6.01**	5.65*

Note. Dum_E1 = Group difference between Environmental affiliates and Humanitarian affiliates; Dum_E2 = Group difference between Environmental affiliates and Non-affiliates; HSC = Humanity self-construal; β 1= Block 1 beta; β 2= Block 2 beta; β 3 = Block 3 beta.

$^{\dagger}p < .10$. $*p < .05$. $**p < .01$. $***p < .001$.

Table 28

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Well-Being and Prosocial Behavior (Controlling for Group Differences) in Study 3 (N = 421)

Variable	Social Well-Being			Overall Well-Being			Prosocial Behavior		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	.11*	.09	.07	.23***	.22***	.19***	.21***	.18***	.15**
Gender (1 = male, 0 = female)	.01	.03	.04	.00	.01	.03	-.02	.00	.02
Education	.06	.02	.00	.09	.07	.05	-.01	-.05	-.07
Income	-.02	-.01	.00	-.01	-.01	.01	.03	.04	.06
Dum_N1		.22***	.16**		.13*	.07		.22***	.15**
Dum_N2		.19***	.18***		.14**	.12*		.18***	.17***
ESC			.19***			.22***			.26***
R^2	.01	.06	.10	.05	.07	.12	.04	.10	.16
ΔR^2	.01	.05	.03	.05	.02	.04	.04	.05	.06
ΔF	1.35	11.33***	14.26***	5.69***	4.89**	20.22***	4.78***	11.83***	30.66***

Note. Dum_N1 = Group difference between Non-affiliates and Environmental affiliates; Dum_N2 = Group difference between Non-affiliates and Humanitarian affiliates; ESC = Ecological self-construal; β 1= Block 1 beta; β 2= Block 2 beta; β 3 = Block 3 beta. $*p < .05$. $**p < .01$. $***p < .001$.

Table 29

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Pro-Environmental Variables (Controlling for Group Differences) in Study 3 (N = 421)

Variable	Pro-Environmental Behavior			Carbon Emission by Living			Carbon Emission by Food			Carbon Emission by Clothing		
	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3	β 1	β 2	β 3
Age	.16**	.14**	.11*	.00	.00	.00	-.25***	-.24***	-.23***	-.08	-.08	-.08
Gender (1 = male, 0 = female)	-.12*	-.08	-.06	.13**	.11*	.11*	.13**	.11*	.11*	-.02	-.04	-.04
Education	.11*	.05	.02	-.13*	-.11*	-.11*	.01	.04	.05	.02	.04	.04
Income	.06	.08	.10*	.30***	.29***	.29***	.07	.06	.05	.13*	.12*	.12*
Dum_E1		-.27***	-.20***		.14*	.14*		.19***	.16**		.17**	.19**
Dum_E2		-.41***	-.31***		.18**	.16**		.21***	.17**		.18**	.20***
ESC			.32***			-.04			-.11*			.06
R^2	.05	.17	.25	.10	.12	.12	.08	.11	.12	.03	.06	.06
ΔR^2	.05	.11	.09	.10	.02	.00	.08	.03	.01	.03	.03	.00
ΔF	5.63***	27.99***	49.18***	11.07***	5.42**	.65	8.37***	7.77***	5.32*	2.79*	6.01**	1.58

Note. Dum_E1 = Group difference between Environmental affiliates and Humanitarian affiliates; Dum_E2 = Group difference between Environmental affiliates and Non-affiliates; ESC = Ecological self-construal; β 1= Block 1 beta; β 2= Block 2 beta; β 3 = Block 3 beta.

$^{\dagger}p < .10$. $^{*}p < .05$. $^{**}p < .01$. $^{***}p < .001$.

Table 30

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Well-Being (Controlling for Human-Nature Orientations) in Study 3 (N = 421)

Variable	Emotional Well-Being				Psychological Well-Being				Social Well-Being				Overall Well-Being			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	.27***	.28***	.26***	.24***	.24***	.24***	.21***	.21***	.11*	.13*	.10*	.09	.23***	.24***	.22***	.20***
Gender (1 = male, 0 = female)	-.01	-.02	-.02	-.03	.01	.01	.01	.01	.01	.01	.01	.00	.00	.00	.00	-.01
Education	.12*	.15**	.14*	.13*	.06	.07	.06	.06	.06	.10	.08	.08	.09	.12*	.10*	.10*
Income	-.01	-.01	.00	.00	-.01	.00	.01	.01	-.02	-.02	-.01	-.01	-.01	-.01	.00	.00
ECO		-.01	-.10	-.09		.05	-.06	-.05		.08	-.03	-.02		.04	-.07	-.06
ANT		.13*	.11*	.10		.09	.07	.07		.22***	.20***	.19***		.16**	.14**	.13*
APA		-.01	.04	.04		-.01	.04	.04		.05	.10	.11		.01	.07	.07
ESC			.22***	.07			.28***	.19**			.27***	.14*			.29***	.15*
HSC				.22***				.12				.18**				.20**
R^2	.06	.07	.10	.13	.04	.05	.10	.11	.00	.06	.11	.12	.04	.06	.12	.14
ΔR^2	.07	.02	.04	.03	.05	.01	.06	.01	.01	.06	.05	.02	.05	.03	.06	.02
ΔF	7.77***	2.32	17.02***	12.44***	5.80***	1.55	25.92***	3.60	1.35	8.58***	24.74***	8.75**	5.69***	4.25**	28.52***	10.28**

Note. ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; ESC = Ecological self-construal; HSC = Humanity self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 31

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Prosocial and Pro-Environmental Behaviors (Controlling for Human-Nature Orientations) in Study 3 (N = 421)

Variable	Prosocial Behavior				Pro-Environmental Behavior			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	.21***	.18***	.16**	.14**	.16**	.14**	.11*	.11*
Gender (1 = male, 0 = female)	-.02	.03	.03	.02	-.12*	-.03	-.03	-.03
Education	-.01	-.06	-.07	-.07	.11*	.04	.02	.02
Income	.03	.05	.06	.06	.06	.07	.08	.08
Ecocentrism		.30***	.22***	.23***		.25***	.16**	.16**
Anthropocentrism		-.01	-.02	-.03		.04	.03	.02
Environmental apathy		-.01	.02	.03		-.27***	-.22***	-.22***
Ecological self-construal			.20***	.07			.24***	.19**
Humanity self-construal				.19**				.06
R^2	.03	.12	.15	.16	.04	.22	.26	.26
ΔR^2	.04	.09	.03	.02	.05	.18	.04	.00
ΔF	4.78***	14.29***	14.35***	9.31**	5.63***	32.06***	22.84***	1.07

Note. β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 32

Hierarchical Regression Models for Testing Incremental Predictive Validity of HSC on Carbon Emission (Controlling for Human-Nature Orientations) in Study 3 (N = 421)

Variable	Carbon Emission by Living				Carbon Emission by Travel				Carbon Emission by Food				Carbon Emission by Clothing				Total Carbon Emission			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	.00	.00	.01	.00	.08	.07	.07	.07	-.25***	-.24***	-.23***	-.22***	-.08	-.06	-.07	-.08	.03	.02	.02	.02
Gender (1 = male, 0 = female)	.13**	.11*	.11*	.10*	-.07	-.07	-.07	-.07	.13**	.12*	.12*	.12*	-.02	-.04	-.04	-.04	-.01	-.02	-.02	-.02
Education	-.13*	-.10*	-.10	-.10	.11*	.10	.10	.10	.01	.03	.04	.04	.02	.06	.05	.05	.06	.07	.07	.07
Income	.30***	.30***	.30***	.30***	.25***	.26***	.26***	.26***	.07	.07	.06	.06	.13*	.12*	.12*	.13*	.33***	.34***	.34***	.34***
ECO		.02	.04	.05		.10	.09	.09		-.09	-.04	-.04		-.06	-.08	-.08		.08	.08	.08
ANT		.06	.07	.06		-.04	-.04	-.04		.00	.01	.01		.15**	.14**	.14*		.00	.00	.00
APA		.12*	.11	.11		.09	.09	.09		.03	.00	.00		.00	.01	.01		.12*	.12	.12
ESC			-.06	-.12			.04	.07			-.14*	-.11			.06	-.02			.00	.01
HSC				.08				-.04				-.04				.11				-.01
R^2	.09	.10	.10	.11	.10	.10	.10	.10	.07	.07	.08	.08	.02	.03	.03	.04	.12	.13	.12	.12
ΔR^2	.10	.02	.00	.00	.10	.01	.00	.00	.08	.01	.01	.00	.03	.02	.00	.01	.13	.01	.00	.00
ΔF	11.07***	3.10*	1.36	1.52	11.77***	1.32	0.62	0.40	8.37***	1.47	6.33*	0.37	2.79*	3.47*	0.96	2.77	15.28***	1.65	0.01	0.03

Note. ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; ESC = Ecological self-construal; HSC = Humanity self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 33

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Well-Being (Controlling for Human-Nature Orientations) in Study 3 (N = 421)

Variable	Emotional Well-Being				Psychological Well-Being				Social Well-Being				Overall Well-Being			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	.27***	.28***	.24***	.24***	.24***	.24***	.21***	.21***	.11*	.13*	.09	.09	.23***	.24***	.20***	.20***
Gender (1 = male, 0 = female)	-.01	-.02	-.03	-.03	.01	.01	.00	.01	.01	.01	.00	.00	.00	.00	-.01	-.01
Education	.12*	.15**	.13*	.13*	.06	.07	.06	.06	.06	.10	.08	.08	.09	.12*	.11*	.10*
Income	-.01	-.01	.00	.00	-.01	.00	.00	.01	-.02	-.02	-.01	-.01	-.01	-.01	.00	.00
ECO		-.01	-.07	-.09		.05	.00	-.05		.08	.02	-.02		.04	-.02	-.06
ANT		.13*	.10	.10		.09	.07	.07		.22***	.19***	.19***		.16**	.13*	.13*
APA		-.01	.03	.04		-.01	.02	.04		.05	.09	.11		.01	.05	.07
HSC			.26***	.22***			.23***	.12			.27***	.18**			.28***	.20**
ESC				.07				.19**				.14*				.15*
R^2	.06	.07	.13	.13	.04	.05	.09	.11	.00	.06	.12	.12	.04	.06	.13	.14
ΔR^2	.07	.02	.06	.00	.05	.01	.05	.02	.01	.06	.06	.01	.05	.03	.07	.01
ΔF	7.77***	2.32	28.77***	1.14	5.80***	1.55	21.43***	7.89**	1.35	8.58***	29.40***	4.32*	5.69***	4.25**	34.18***	4.93*

Note. ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; HSC = Humanity self-construal; ESC = Ecological self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 34

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Prosocial and Pro-Environmental Behaviors (Controlling for Human-Nature Orientations) in Study 3 (N = 421)

Variable	Prosocial Behavior				Pro-Environmental Behavior			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	.21***	.18***	.15**	.14**	.16**	.14**	.11*	.11*
Gender (1 = male, 0 = female)	-.02	.03	.02	.02	-.12*	-.03	-.04	-.03
Education	-.01	-.06	-.07	-.07	.11*	.04	.03	.02
Income	.03	.05	.06	.06	.06	.07	.08	.08
Ecocentrism		.30***	.25***	.23***		.25***	.21***	.16**
Anthropocentrism		-.01	-.03	-.03		.04	.02	.02
Environmental apathy		-.01	.02	.03		-.27***	-.24***	-.22***
Humanity self-construal			.23***	.19**			.17***	.06
Ecological self-construal				.07				.19**
R^2	.03	.12	.16	.16	.04	.22	.24	.26
ΔR^2	.04	.09	.05	.00	.05	.18	.03	.02
ΔF	4.78***	14.29***	22.76***	1.18	5.63***	32.06***	14.07***	9.56**

Note. β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 35

Hierarchical Regression Models for Testing Incremental Predictive Validity of ESC on Carbon Emission (Controlling for Human-Nature Orientations) in Study 3 (N = 421)

Variable	Carbon Emission by Living				Carbon Emission by Travel				Carbon Emission by Food				Carbon Emission by Clothing				Total Carbon Emission			
	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4	β 1	β 2	β 3	β 4
Age	.00	.00	.00	.00	.08	.07	.07	.07	-.25***	-.24***	-.22***	-.22***	-.08	-.06	-.08	-.08	.03	.02	.02	.02
Gender (1 = male, 0 = female)	.13**	.11*	.11*	.10*	-.07	-.07	-.07	-.07	.13**	.12*	.12*	.12*	-.02	-.04	-.04	-.04	-.01	-.02	-.02	-.02
Education	-.13*	-.10*	-.11*	-.10	.11*	.10	.10	.10	.01	.03	.04	.04	.02	.06	.05	.05	.06	.07	.07	.07
Income	.30***	.30***	.30***	.30***	.25***	.26***	.26***	.26***	.07	.07	.06	.06	.13*	.12*	.13*	.13*	.33***	.34***	.34***	.34***
ECO		.02	.02	.05		.10	.10	.09		-.09	-.07	-.04		-.06	-.08	-.08		.08	.08	.08
ANT		.06	.06	.06		-.04	-.04	-.04		.00	.01	.01		.15**	.14*	.14*		.00	.00	.00
APA		.12*	.12*	.11		.09	.09	.09		.03	.01	.00		.00	.01	.01		.12	.11	.12
HSC			.01	.08			.00	-.04			-.10*	-.04			.10	.11			.00	-.01
ESC				-.12				.07				-.11				-.02				.01
R^2	.09	.10	.10	.11	.10	.10	.10	.10	.07	.07	.08	.08	.02	.03	.04	.04	.12	.13	.12	.12
ΔR^2	.10	.02	.00	.01	.10	.01	.00	.00	.08	.01	.01	.01	.03	.02	.01	.00	.13	.01	.00	.00
ΔF	11.07***	3.10*	0.06	2.83	11.77***	1.32	0.00	1.02	8.37***	1.47	4.15*	2.52	2.79*	3.47*	3.68	0.07	15.28***	1.65	0.01	0.03

Note. ECO = Ecocentrism; ANT = Anthropocentrism; APA = Environmental apathy; HSC = Humanity self-construal; ESC = Ecological self-construal; β 1 = Block 1 beta; β 2 = Block 2 beta; β 3 = Block 3 beta; β 4 = Block 4 beta.

*p < .05. **p < .01. ***p < .001.

Table 36

Single-Country/Society Analysis: Modifications and Global Fit in Study 4 (N = 12,253)

Group	*Modification*	*CFI*	*TLI*	*RMSEA*	*SRMR*
1. Argentina	e5 < -- > e6; e1 < -- > e2	.992	.979	.076	.020
2. Australia	e2 < -- > e3	.988	.974	.098	.019
3. Brazil		.984	.971	.096	.032
4. Canada		.990	.982	.082	.018
5. China		.986	.974	.084	.027
6. Egypt		.982	.966	.095	.036
7. Finland	e1 < -- > e5; e1 < -- > e6	.995	.987	.068	.013
8. France		.992	.984	.074	.024
9. Germany	e1 < -- > e3	.992	.983	.074	.021
10. Hong Kong		.983	.968	.098	.027
11. India		.982	.965	.100	.027
12. Indonesia		.982	.967	.097	.029
13. Italy	e2 < -- > e3	.986	.971	.098	.027
14. Japan		.987	.976	.088	.032
15. Malaysia		.992	.985	.071	.022
16. Mexico	e1 < -- > e2; e1 < -- > e3	.988	.970	.087	.027
17. Netherlands		.980	.989	.084	.020
18. New Zealand		.990	.981	.089	.025
19. Nigeria		.973	.986	.089	.024
20. Pakistan		.987	.976	.085	.026
21. Philippines		.989	.979	.080	.020
22. Portugal		.992	.985	.071	.024
23. Russia	e1 < -- > e2; e1 < -- > e3	.990	.975	.097	.015
24. South Africa	e2 < -- > e3	.996	.992	.051	.017
25. South Korea	e1 < -- > e4; e2 < -- > e5	.987	.967	.097	.023
26. Singapore	e3 < -- > e6; e1 < -- > e3	.990	.975	.095	.022
27. Spain	e1 < -- > e2	.990	.978	.083	.025
28. Sweden	e2 < -- > e4; e1 < -- > e5; e1 < -- > e6	.995	.986	.062	.028
29. Taiwan		.987	.977	.094	.026
30. Thailand	e2 < -- > e3	.989	.977	.089	.023
31. Turkey	e1 < -- > e3	.986	.97	.094	.030
32. UAE	e5 < -- > e6	.992	.983	.073	.022
33. UK	e1 < -- > e3	.993	.984	.077	.026
34. USA		.994	.989	.065	.021
35. Vietnam	e2 < -- > e3	1.000	.999	.018	.014

Table 37

MGCFA: Fit Measures of the Invariance test in Study 4 (N = 12,253)

Model	*CFI*	*TLI*	*RMSEA*	*SRMR*
1. Configural Invariance	.981	.965	.018	.051
2. Metric Invariance	.977	.970	.017	.051
3. Partial Scalar Invariance	.925	.918	.027	.053

Table 38

Sample Size, Means, and Standard Deviations of HSC and ESC among the Countries/Societies in Study 4 (N = 12,253)

Country	Sample Size	Humanity Self-Construal		Ecological Self-Construal	
		Mean	*SD*	Mean	*SD*
1. Argentina	405	5.45	1.05	5.59	0.86
2. Australia	276	4.82	1.16	5.45	1.03
3. Brazil	392	5.52	0.91	5.93	0.80
4. Canada	272	4.48	1.16	5.39	0.93
5. China	246	4.71	1.16	5.90	0.68
6. Egypt	303	4.58	1.15	5.98	0.73
7. Finland	304	4.47	1.22	5.38	0.91
8. France	369	5.08	0.85	5.36	0.90
9. Germany	316	5.99	0.75	5.42	0.97
10. Hong Kong	289	5.66	0.88	5.43	0.81
11. India	402	5.27	1.01	6.04	0.71
12. Indonesia	464	3.98	1.14	5.90	0.71
13. Italy	401	5.44	0.92	5.68	0.83
14. Japan	380	5.46	0.94	4.69	0.99
15. Malaysia	388	4.80	1.07	5.68	0.79
16. Mexico	438	4.92	1.17	5.79	0.77
17. Netherland	196	5.96	0.81	5.28	1.00
18. New Zealand	255	6.01	0.72	5.45	0.88
19. Nigeria	404	5.85	0.78	6.11	0.64
20. Pakistan	349	5.38	0.92	5.99	0.66
21. Philippines	437	4.58	1.15	6.03	0.67
22. Portugal	384	5.53	1.00	5.71	0.77
23. Russia	413	4.85	0.88	5.36	0.92
24. South Africa	394	5.28	0.97	5.85	0.74
25. South Korea	326	5.28	1.06	5.35	0.72
26. Singapore	299	4.45	1.14	5.58	0.80
27. Spain	390	5.21	0.97	5.80	0.83
28. Sweden	297	5.34	0.93	5.17	0.94
29. Taiwan	358	5.59	0.95	5.65	0.82
30. Thailand	416	5.91	0.88	5.71	0.78
31. Turkey	376	4.91	1.16	5.86	0.78
32. UAE	380	4.89	1.34	6.07	0.79
33. UK	283	5.65	0.84	5.40	0.96
34. USA	227	5.61	0.89	5.41	0.97
35. Vietnam	424	5.38	0.92	5.88	0.79

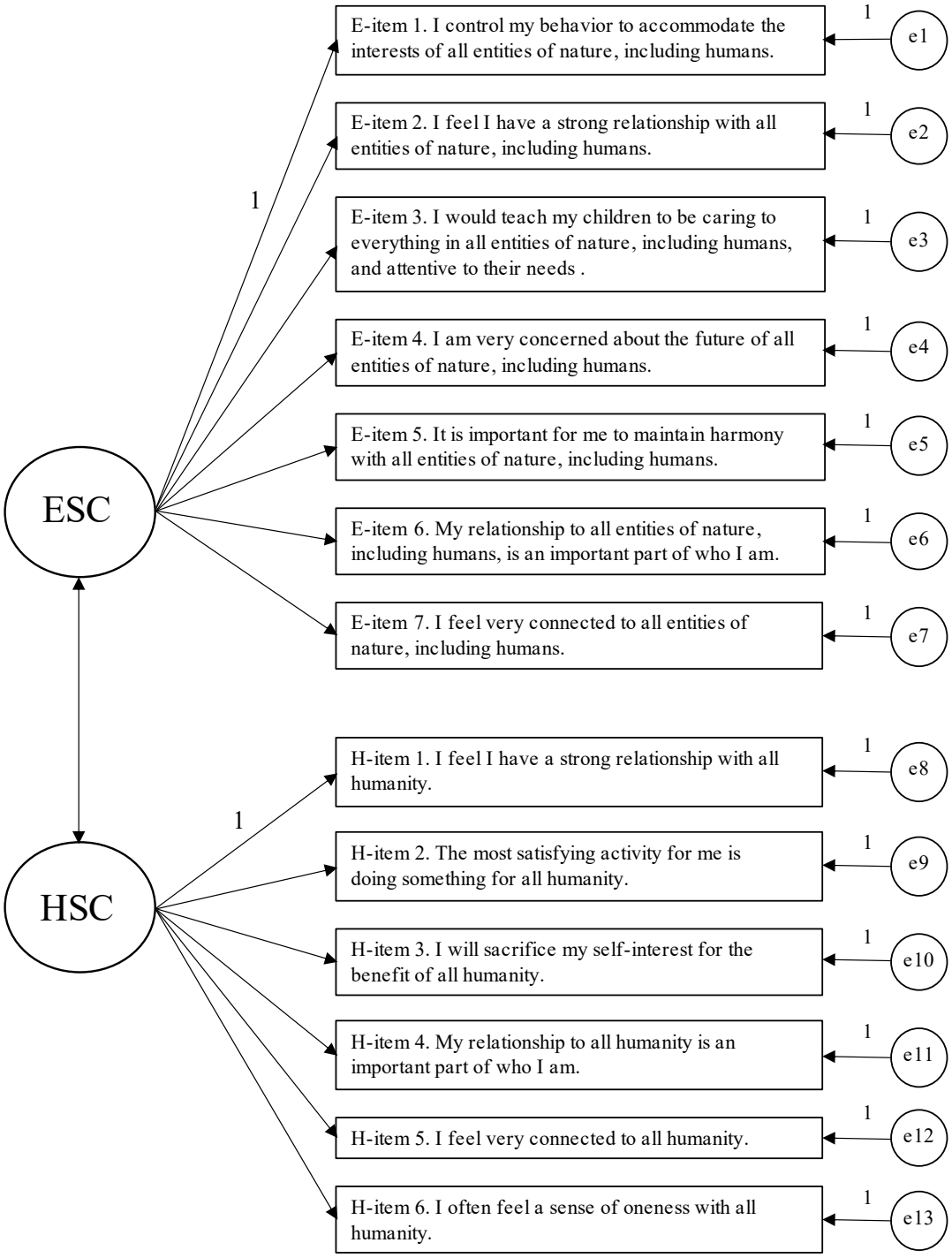

Figure 1. CFA of Humanity Self-Construal and Ecological Self-Construal.

Note: e1-e13 are measurement errors of the respective indicators.

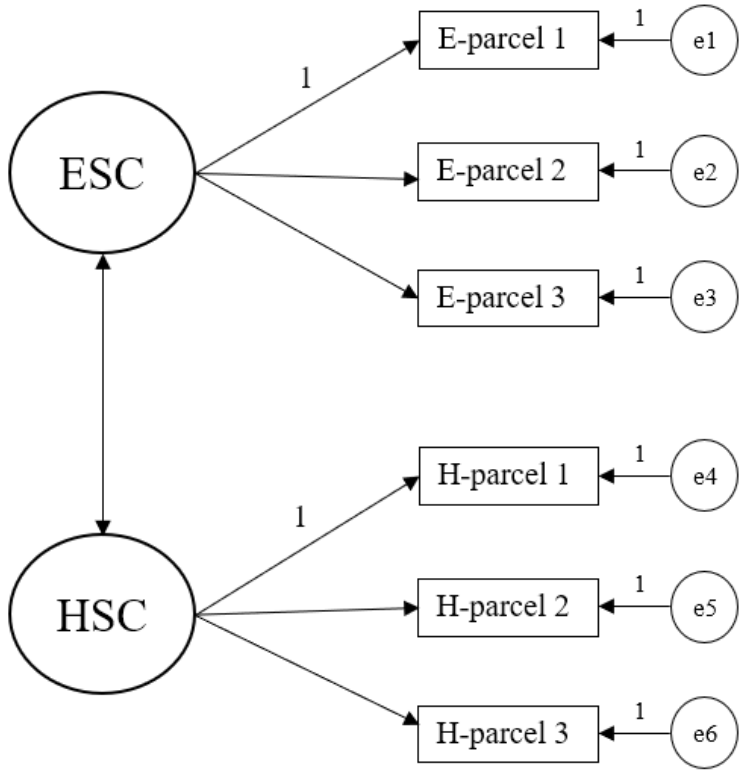

Figure 2. CFA of Humanity Self-Construal and Ecological Self-Construal parcels.

Note: e1-e6 are measurement errors of the respective indicators.