Self-transcendent emotion dispositions: Greater connections with nature and more sustainable behavior☆

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ABSTRACT

In three studies, we explored how different classes of positive emotion dispositions may have different relations with pro-environmental outcomes despite sharing positive valence. We hypothesized that self-transcendent emotions (awe, compassion, love) would relate to more sustainable behaviors, beliefs, values, and self-nature representations because these emotions support a prosocial mindset and broaden the self-concept. Conversely, we hypothesized that self-interested emotions (joy, contentment, pride, amusement) would not relate to more of these pro-environmental outcomes and would instead predict more self-orientated beliefs and values because these emotions involve a greater self-focus. In Study 1, self-transcendent emotions uniquely predicted greater self-reported pro-environmental behavior, biospheric concern, nature connectedness, and more sustainable self-nature representations, whereas self-interested emotions did not and instead predicted greater egoistic concern. Study 2 aimed to replicate these findings and added measures of values and political beliefs. For self-transcendent emotions, the results of Study 1 were replicated, and it was also found that they uniquely predicted greater endorsement of self-transcendent values and less political conservatism. Self-interested emotions uniquely predicted less pro-environmental behavior and greater endorsement of self-enhancement values and conservative beliefs. Finally, Study 3 found that self-transcendent emotions but not self-interested emotions uniquely predicted more actual recycling weeks later. Implications for the intersection of positive emotions research and sustainability are discussed.

1. Introduction

Now more than ever, it is imperative to address the deleterious effects of human behavior on the natural environment. Anthropogenic climate change is increasing sea levels, dwindling biodiversity, and eviscerating vital ecosystems (e.g., Albright et al., 2010; Arneth et al., 2020). Further, climate change will continue to increase human suffering from more infectious diseases, reduced food and water supplies, and forced migration of millions of people (Crimmins et al., 2016; IPCC, 2014). Although most Americans believe that these outcomes are real (Howe et al., 2015), many people fail to take actions necessary to reduce their carbon footprints (Hall et al., 2018). Additionally, exposure to climate change information can trigger cognitive reactance, particularly among those harboring biases against the environmental movement (Hart & Feldman, 2018; Sensenig & Brehm, 1968). Because people's responses to sustainability challenges are insufficient to the magnitude of the threat, it is important to identify motivational factors that can encourage more pro-environmental action.

Leveraging affect offers one path to promoting conservation behavior. Although some research has focused on how negative emotions such guilt or fear motivate environmental behavior (e.g., Mallett, 2012; van Zomeren et al., 2010), positive affect has recently been identified as a potentially useful route for encouraging pro-environmental outcomes by fostering connections with nature (Zelenski & Desrochers, 2021) and by encouraging prosocial mindsets (Shiota et al., 2021). Indeed, two reviews have found a positive relation between happiness and pro-environmental behavior across multiple studies (Kasser, 2017; Zawadzki et al., 2020). Other research, though, has not supported the role of positivity in promoting sustainability (e.g., Lange & Dewitte, 2020; Wang et al., 2018).

1.1. Self-transcendent and self-interested emotions

Rather than focusing on general positive affect, it may be more

fruitful to investigate specific types of positive emotion. Historically, positive emotions have been viewed as a single construct (e.g., Ekman, 1992) hypothesized to have broad effects on thought and behavior (Fredrickson, 2001). However, recent research has found that particular types of positive emotions can produce different outcomes (Shiota et al., 2006; 2017). One class of positive emotions that seems especially promising for motivating pro-environmental behavior is self-transcendent emotion. *Self-transcendent emotions* (STEs) are driven by other-orientated appraisals that shift attention towards the needs of others (e.g., Haidt, 2003; Stellar et al., 2017).

These prosocial aspects of STEs should encourage pro-environmental outcomes for several reasons. First, STEs are theorized to entail a greater focus on the needs of others than on selfish desires (Stellar et al., 2017), fostering cooperation and prosocial behaviors (Cavanaugh et al., 2015; Leiberg et al., 2011; Piff et al., 2015). The importance of focusing on others for sustainability has also been supported in the context of values. Values are general, stable beliefs that guide people's life choices and interactions with others. In Schwartz's (1994) basic values framework, people are more self-transcendent to the degree that they endorse values of universalism (e.g., world peace, social justice) and benevolence (e.g., honesty, helpfulness). Self-transcendence predicts prosocial mindsets (Caprara et al., 2012) and more pro-environmental behavior (McConnell & Jacobs, 2020; Schultz et al., 2005). Similarly, being concerned about environmental problems because of their effects on nature (i.e., biospheric concern) predicts greater pro-environmental behavior (Schultz, 2001; Schultz et al., 2004). Because STEs promote concern for others and foster prosocial orientations, they should promote greater biospheric concern and endorsement of self-transcendent values.

Second, self-transcendent emotions facilitate a broadening of the self-concept to include other entities. For example, awe increases feelings of interconnectedness with others (Bai et al., 2017) and leads to greater inclusion of others in the self-concept (Shiota et al., 2007). Similarly, love expands the self to include others (Aron et al., 1992) and compassion leads people to feel more similarity to others (Oveis et al., 2010). Although much of this past research has focused on how STEs relate to humans, people also feel self-transcendent emotions tied to nature. For example, natural settings are strong elicitors of awe (Shiota et al., 2007) and people express feelings of compassion and love towards nature (Lumber et al., 2017; Perkins, 2010). Because STEs can be directed towards nature in addition to people, it is reasonable to expect that STEs may also lead to inclusion of nature in self. Because including nature in one's self-concept encourages more pro-environmental behavior (Schultz, 2001), self-transcendent emotions may also increase sustainable actions by leading to greater self-nature overlap and connectedness with nature. Additionally, STEs lead to a shrinking of the self (Piff et al., 2015), which could lead people to see themselves as smaller than nature, which predicts more pro-environmental behavior (McConnell & Jacobs, 2020).

Because of the promise of STEs for sustainability (Moreton, 2018; Zelenski & Desrochers, 2021), several studies have begun to examine their consequences empirically. For example, Yang et al. (2018) found that experiencing awe increases intention to act sustainably because of increased connectedness with nature. Being induced to feel compassion for suffering humans can also increase pro-environmental behavioral intentions (Pfattheicher et al., 2016), and feeling compassion for climate change victims increases support for government mitigation policies (Lu & Schuldt, 2016). Less research has directly explored the role of love, but connections to nature based on love predict a greater willingness to protect the environment (Perkins, 2010). However, these studies have only measured individual self-transcendent emotions rather than the class of emotions as a whole. In addition, past work has mostly measured these emotions in the moment (i.e., state level). Measuring dispositional (trait) emotions instead would be insightful because they are theorized to be stronger predictors of behavior over time compared to state emotions (Rosenberg, 1998). Further, many past studies have only used cross sectional designs with self-report measures of pro-environmental

behavior, which may not always reflect real-world conservation (Lange & Dewitte, 2019). Accordingly, the current research expands on past work by measuring dispositional STEs and by using a two-time point design in Study 3 with an actual measure of pro-environmental behavior.

In contrast to STEs, most other positive emotions are based on appraisals of self-relevance. For example, people feel joy when experiencing opportunities that benefit the self (Lazarus, 1991), feel contentment when the self is secure (Fredrickson, 1998), and feel pride when experiencing a personal success (Tracy & Robins, 2007). Although amusement is often elicited by others and can lead to social affiliation in some circumstances (Martin, 2007), it has not been considered a STE in past work (e.g., Stellar et al., 2017; Van Cappellen et al., 2013) because it is associated with greater self-esteem (Kuiper et al., 1993) and with narcissism (Veselka et al., 2010). Additionally, several studies have found that amusement does not lead to greater prosocial behavior (Piff et al., 2015; Yang et al., 2018) or to reduced self size (Bai et al., 2017). Thus, for the purpose of comparisons with STEs, we consider joy, contentment, pride, and amusement to be *self-interested emotions* (SIEs) because they all, to some degree, entail self-enhancement. Importantly, STEs and SIEs have demonstrated unique predictive utility in past psychological research. For example, Piff and Moskowitz (2018) found that awe, compassion, and love were associated with lower social class, whereas contentment, pride, and amusement were associated higher social class (joy was not measured), and lower social class predicts greater prosocial behavior compared to high social class (Piff et al., 2010). Similarly, Van Cappellen et al. (2013) found that STEs lead to greater spirituality whereas SIEs did not. Furthermore, seeing nature as larger than then the self produces more STEs but not more SIEs (McConnell & Jacobs, 2020), suggesting that these two classes of positive emotions may be related to nature engagement differently.

Thus, SIEs may not produce the same conservation benefits as STEs because self-enhancement can be detrimental for environmental action. Many environmental issues, including climate change, are considered social dilemmas where the good of nature and of future generations are at odds with an individual's self-interests (Van Vugt, 2009). This "tragedy of the commons" (Hardin, 1968) framework is supported by findings that endorsement of self-enhancement values (i.e., power and achievement; Schwartz, 1994) negatively predicts pro-environmental beliefs and behaviors (Klöckner, 2013; Schultz et al., 2005). Similarly, being concerned about the environment for egoistic reasons (e.g., how does the environment affect my future or my lifestyle) does not predict greater pro-environmental beliefs (Schultz, 2001) and sometimes predicts less sustainable behavior (e.g., McConnell & Jacobs, 2020; Schultz et al., 2004). Because SIEs entail a similar focus on selfish needs (Stellar et al., 2017), it is hypothesized that SIEs will not predict greater pro-environmental outcomes and may instead predict detrimental outcomes such as greater endorsement of self-enhancing values, egoistic concern, less inclusion of nature in self, and seeing nature as relatively smaller than the self.

1.2. The current work

In three studies, we measured STEs and SIEs to evaluate their independent relations with pro-environmental outcomes. Because STEs are driven by other-orientated appraisals, motivate prosocial behaviors, and facilitate more inclusive self-concepts (Algoe & Haidt, 2009; Stellar et al., 2017), we hypothesized that greater STEs would uniquely predict[1] greater pro-environmental behavior, biospheric concern, other-enhancing values, and more sustainable relationships with nature

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[1] In the current work, we use the term "predict" to refer to "predictive utility," which is the degree to which a focal variable meaningfully corresponds to a criterion variable in regression analyses (Cohen et al., 2003). No causality is implied.

(e.g., greater connections with nature, seeing nature as relatively larger than the self). Conversely, SIEs are centered around self-enhancement (Oveis et al., 2010; Stellar et al., 2017), and greater self-focus is detrimental to pro-environmental behavior (Van Vugt, 2009). Therefore, we hypothesized that greater SIEs would not uniquely predict pro-environmental behavior and might even predict environmentally harmful outcomes such as less pro-environmental behavior, greater egoistic concern, greater self-enhancing values, and less sustainable relationships with nature (e.g., less connections nature in self, seeing nature as smaller than the self). Although people often have a general predilection to report greater positive emotions overall (which should result in significant correlations between STEs and SIEs; Dixson et al., 2018; Lucas et al., 2003), the current work focused on the unique contributions of STEs and SIEs in predicting pro-environmental outcomes.

Study 1 provided a preliminary examination of these hypotheses by measuring STEs and SIEs along with self-reported behavior, environmental beliefs, self-nature representations, and connectedness with nature. Multiple regression analyses evaluated the unique predictive utility of these two emotion types by examining their unique relations with these pro-environmental outcomes. Study 2 replicated these findings and tested relations with two additional outcomes: values and political beliefs. Examining relations involving self-transcendence was of interest because it could further establish that these types of positive emotions (i. e., STEs and SIEs) are potentially rooted in different value systems that drive more prosocial or more selfish interaction approaches, respectively. Political ideology was examined because holding conservative political beliefs is one of the strongest predictors of anti-environmental positions such as climate change denial and less environmental concern (Cruz, 2017; Whitmarsh, 2011). Finally, Study 3 assessed these positive emotion types and then (weeks later) observed actual recycling behavior in a controlled laboratory setting.

2. Study 1: Initial examination of self-transcendent and self-interested positive emotions

In our first study, we examined how STEs and SIEs uniquely predicted several outcomes relevant to sustainability: environmental concern, self-nature representations, connectedness to nature, and pro-environmental behavior. For STEs, we measured awe, compassion, and love. Although other STEs have been theorized (i.e., gratitude, elevation), we chose these three positive emotions because past work has shown they are related to nature exposure (e.g., Lumber et al., 2017; Perkins, 2010; Shiota et al., 2007), because they have been the most studied in general emotion research (e.g., Piff & Moskowitz, 2018; Shiota et al., 2007; Stellar et al., 2017), and because there is a well-validated scale to measure all of them (the Dispositional Positive Emotions Scale; Shiota et al., 2006). For SIEs, we measured joy, contentment, pride, and amusement because these emotions all are based on appraisals of self-relevance or promote self-enhancement (Fredrickson, 1998; Kuiper et al., 1993; Lazarus, 1991; Tracy & Robins, 2007) and because they can also be reliably measured with the Dispositional Positive Emotions Scale. Environmental concern was assessed with Schultz's (2001) environmental concern scale, which examines three different motivations for protecting the environment: biospheric concern (e.g., protecting plants and animals), altruistic concern (e.g., preserving nature for human communities and future generations), and egoistic concern (e.g., conserving nature for one's personal health and benefit). Biospheric concern typically predicts greater pro-environmental behavior, whereas egoistic concern sometimes predicts less (Schultz, 2001; Schultz et al., 2004). The self-nature representations of inclusion of nature in self (INS) and relative nature-self size (NSS) were also measured due to their hypothesized relations to both STEs and pro-environmental behavior. Greater inclusion of nature in one's self-concept predicts greater pro-environmental behavior as well as greater biospheric concern (Schultz, 2001). Also, the degree to which nature is considered to be relatively larger than the

self predicts greater biospheric concern, less egoistic concern, and more pro-environmental behavior (McConnell & Jacobs, 2020). We also aimed to replicate past research that found significant relations between self-nature representations and STEs (McConnell & Jacobs, 2020). Finally, connectedness to nature was measured because it consistently predicts pro-environmental behavior (Tam, 2013; Zelenski & Nisbet, 2014). In sum, we expected STEs to uniquely predict greater biospheric concern, greater inclusion of nature in the self, viewing nature as relatively larger than the self, greater connectedness to the nature, and performing more pro-environmental behaviors. Conversely, we expected SIEs to not show these distinct relations and, if anything, reveal unique predictions in the opposite direction of STEs.

2.1. Method

2.1.1. Participants

276 undergraduates completed a series of questionnaires online for course credit as part of a mass screening administration, including several measures used in the current work. Because the survey was open to the entire subject pool, it was impossible to constrain the sample size. A post hoc power analysis conducted in G*Power (Faul et al., 2007) based on the smallest significant correlation between emotion and an outcome measure ($r = 0.17$) found 80.04% power. Attentions checks were included to foster high quality data (Aust et al., 2013), and 10 participants failed them, resulting in a final sample of 266 participants ($M_{age} = 19.09$, $SD = 1.10$; 145 females, 74 males, 47 unreported).

2.1.2. Measures

Dispositional positive emotions. First, participants completed the dispositional positive emotions scale (DPES; Shiota et al., 2006) to measure STEs and SIEs. Participants indicated, on a scale ranging from 1 (strongly disagree) to 7 (strongly agree), their agreement with 38 items assessing individual differences in the extent to which they experience seven discrete positive emotions. Following Stellar et al. (2017), the mean response for the 17 items measuring STEs (i.e., love, compassion, awe) was calculated, producing an overall STE score ($M = 5.11$, $SD = 0.76$, $\alpha = 0.86$). Similarly, the mean response for the 21 items measuring SIEs (i.e., joy, contentment, pride, amusement) was computed, resulting in an overall SIE score ($M = 4.90$, $SD = 0.86$, $\alpha = 0.92$).

Environmental concern. Next, participants completed the 12-item Ecological Concern Scale (Schultz, 2001), which assessed the degree to which participants endorsed the importance of concerns about environmental issues on a scale from 1 (not important) to 7 (supreme importance). The items included egoistic concerns (e.g., effects on my health, my lifestyle; $M = 5.59$, $SD = 1.19$, $\alpha = 0.88$), altruistic concerns (e.g., effects on future generations, people in my community; $M = 6.07$, $SD = 0.85$, $\alpha = 0.78$), and biospheric concerns (e.g., effects on plants, animals; $M = 5.33$, $SD = 1.12$, $\alpha = 0.86$).

Self-nature representations. Afterwards, participants completed two measures to assess self-nature representations. First, they completed the Inclusion of Nature in Self Scale (INS; Schultz, 2001), in which they indicated the degree to which they view nature as part of their self-concept (each represented by separate circles) by endorsing the amount of overlap using depictions ranging from 1 (no overlap) to 7 (almost complete overlap; $M = 4.00$, $SD = 1.39$). Next, participants completed the relative size component of Nature-Self Size (NSS; McConnell & Jacobs, 2020) in which they selected a diagram from a set ranging from 1 (self is much larger than nature) to 7 (nature is much larger than self; $M = 4.08$, $SD = 1.81$) that best represented their belief about the relative size of nature compared to the self, ignoring the overlap between the circles.

Connectedness to nature. Participants also completed the Connectedness to Nature Scale (CNS; Mayer & Frantz, 2004), responding to 14-items assessing their feelings of closeness with nature (e.g., I often feel a sense of oneness with the natural world around me, I think of the natural world as a community to which I belong) on scale from 1

(strongly agree) to 5 (strongly disagree). The mean response was computed ($M = 3.14$, $SD = 0.50$, $\alpha = 0.74$), with larger scores reflecting more connection to nature.

Pro-environmental behavior. Finally, participants completed a self-report measure of how often they performed 12 common conservation behaviors that are applicable to student populations (e.g., I use a reusable water bottle, I turn off the lights when I leave a room; McConnell & Jacobs, 2020) on a scale ranging from 1 (never) to 5 (always). The mean response to these behaviors was calculated ($M = 3.15$, $SD = 0.52$, $\alpha = 0.72$), with greater scores indicating more frequent pro-environmental behavior (the full list of items can be found in the Supplementary Materials).

2.2. Results

2.2.1. Correlational analyses

Zero-order correlations were computed and are presented in Table 1. STEs and SIEs showed a significant correlation ($r = 0.74$, $p < .001$) that was below the threshold for discriminant validity[2] ($r = 0.80$; Brown, 2006). Greater STEs were associated with greater biospheric concern, altruistic concern, egoistic concern, inclusion of nature in self, connectedness to nature, and pro-environmental behavior. Greater SIEs were associated with greater altruistic concern, egoistic concern, inclusion of nature in self, and connectedness to nature (but unlike STEs, SIEs were not associated with biospheric concern or with pro-environmental behaviors). Neither emotional disposition was associated with relative nature-self size.

Next, correlations involving the environmental measures found that greater biospheric concern was associated with greater altruistic concern, inclusion of nature in self, nature-self relative size, connectedness to nature, and pro-environmental behavior. Greater altruistic concern was associated greater with greater egoistic concern, connectedness to nature, and pro-environmental behavior. More egoistic concern was associated with less relative size. Turning to the self-nature representations, greater inclusion of nature in self was associated with greater relative nature-self size, connectedness to nature, and pro-environmental behavior. Finally, greater relative nature-self size was also related to greater connectedness to nature and pro-environmental behavior.

2.2.2. Multiple regression analyses

To examine the central question of whether STEs and SIEs independently predicted different patterns of pro-environmental outcomes, multiple regression analyses for each outcome measure were conducted with STEs and SIEs entered as simultaneous predictors, and these results are displayed in Table 2. First, STEs uniquely predicted greater biospheric concern, greater altruistic concern, greater inclusion of nature in self, greater relative nature-self size, greater connectedness to nature, and more pro-environmental behaviors. On the other hand, SIEs only uniquely predicted greater egoistic concern. Inspection of variance inflation factor scores (VIF = 2.21) indicated no concerns with multicollinearity (i.e., VIFs<10; see Thompson et al., 2017).

2.3. Discussion

Study 1 replicated past work (e.g., McConnell & Jacobs, 2020; Schultz et al., 2004), observing that greater biospheric concern

predicted many pro-environmental outcomes (e.g., inclusion of nature in self, performing more pro-environmental behaviors). Similarly, self-nature representations replicated past findings that viewing nature as more included in one's self-concept and seeing nature as relatively larger than the self predicted greater biospheric concern, more connectedness to nature, and performing more pro-environmental behaviors (e.g., McConnell & Jacobs, 2020; Tam, 2013).

Although STEs and SIEs were related to each other (reflecting how experiencing a range of positive emotions often go hand in hand; e.g., Dixson et al., 2018; Lucas et al., 2003), the multiple regression analyses clearly showed that STEs and SIEs revealed different patterns of independent relations with conservation outcomes. Specifically, STEs and not SIEs uniquely predicted important conservation outcomes such as greater biospheric concern, inclusion of nature in self, connectedness to nature, and pro-environmental behaviors. In fact, the only unique prediction observed for SIEs involved holding more egoistic concern, an outcome often associated with less pro-environmental engagement (e.g., Schultz et al., 2004). Even though Study 1 found that STEs and SIEs revealed distinct patterns of predictive utility with pro-environmental outcomes, it would be useful to replicate these findings and to explore broader connections with value endorsements (Schwartz, 1994) and for holding conservative ideologies linked to climate change denial (Cruz, 2017; Whitmarsh, 2011). Thus, Study 2 replicated Study 1 and added value and ideology measures.

3. Study 2: Replication with value and ideology measures

Study 2 had two primary objectives. First, we replicated Study 1 with an even larger sample. Thus, all Study 1 measures were included in Study 2 except for the Connectedness to Nature Scale, which was not included because of time constraints in survey administration. Second, we explored how STEs and SIEs may differentially predict other important constructs: beliefs and political ideology. In Schwartz's (1992) basic values framework, people are more self-transcendent as they endorse other-oriented values related to universalism and benevolence more strongly. Greater endorsement of these self-transcendent values predicts greater pro-environmental behavior (Schultz et al., 2005) and more sustainable self-nature representations such as greater inclusion of nature in self and viewing nature as relatively larger than the self (McConnell & Jacobs, 2020). Conversely, people are more self-enhancing when they endorse values relating to power and achievement to a greater degree, and these values predict weaker pro-environmental behavior (Schultz et al., 2005). Accordingly, we hypothesized that STEs should be uniquely tied to self-transcendent values and that SIEs should distinctly predict self-enhancing values. Finally, we measured political ideology because political conservatism is a self-focused ideology that predicts less pro-environmental beliefs and greater climate change denial (Cruz, 2017; Whitmarsh, 2011). We hypothesized that STEs would uniquely predict less conservative beliefs whereas SIEs would uniquely predict more conservative beliefs.

3.1. Method

3.1.1. Participants

533 undergraduate participants completed multiple questionnaires online for course credit as part of a mass survey administration, including several measures that were used in the current work. Because the survey was open to the entire subject pool, it was impossible to constrain the sample size and thus an a priori sample size analysis was not conducted. A post hoc power analysis conducted in G*Power (Faul et al., 2007) based on the smallest significant correlation between emotion and an outcome measure ($r = -0.14$) found 80.93% power. Once again, an attention check was included. 125 participants failed the attention check, and four participants were excluded because of missing data, resulting in a final sample of 404 participants ($M_{age} = 18.97$, $SD = 1.47$; 298 female, 99 male, 7 other or chose not to respond). All analyses

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[2] Because of the strength of this correlation, some readers may wonder if the two types of emotion reflect one underlying construct. Although the purpose of our research was not to demonstrate complete distinctiveness, in the Supplementary Materials (Table S1) we report the results of Confirmatory Factor Analyses comparing two- and one-factor solutions for all three studies. Across all studies, both models provide similar fit, with the two-factor model providing descriptively better fit on some indices.

Table 1

Study 1 zero-order correlations.

	STEs	SIEs	BC	AC	EC	INS	NSS	CNS
STEs	–							
SIEs	.74**	–						
Biospheric Concern	.17**	.09	–					
Altruistic Concern	.47**	.41**	.25**	–				
Egoistic Concern	.26**	.37**	-.03	.39**	–			
INS	.25**	.21**	.36**	.07	-.01	–		
NSS	.06	-.03	.26**	.01	-.26**	.38**	–	
CNS	.35**	.26**	.45**	.13*	.01	.50**	.34**	–
PEB	.21**	.10	.32**	.15*	-.03	.45**	.26**	.40**

Note. STEs (self-transcendent emotions), SIEs (self-enhancing emotions), INS (inclusion of nature in self), NSS (relative nature-self size), CNS (connectedness to nature), PEB (pro-environmental behavior).

*p < .05, **p < .01.

Table 2

Study 1 multiple regression analyses for unique predictive utility of STEs and SIEs.

Outcome Variables	β (STEs)	SE	β (SIEs)	SE	R^2
Biospheric Concern	.24**	.19	-.09	.20	.03*
Altruistic Concern	.37**	.09	.13	.15	.23**
Egoistic Concern	-.03	.13	.39**	.12	.14**
INS	.21*	.16	.05	.14	.06**
NSS	.18*	.34	-.16	.32	.02
CNS	.35**	.06	.00	.05	.13**
PEB	29**	.06	-.11	.05	.05**

Note. STEs (self-transcendent emotions), SIEs (self-enhancing emotions), INS (inclusion of nature in self), NSS (relative nature-self size), CNS (connectedness to nature), PEB (pro-environmental behavior).

*p < .05, **p < .01.

reported only included those who met a priori inclusion criteria, however, additional analyses that included all participants produced identical results.

3.1.2. Measures

Dispositional positive emotions. As in Study 1, participants completed the DPES (Shiota et al., 2006) to assess discrete positive emotions. The mean response across the STE items was computed, producing an overall STE score (*M* = 5.11, *SD* = 0.76, α = 0.86). Similarly, the mean response across the SIE items was computed, resulting in an overall SIE score (*M* = 4.92, *SD* = 0.89, α = 0.89).

Environmental concern. Next, as in Study 1, participants completed the Ecological Concern Scale (Schultz, 2001) to assess egoistic (*M* = 5.94, *SD* = 1.08, α = 0.89), altruistic (*M* = 6.01, *SD* = 0.99, α = 0.87), and biospheric (*M* = 5.16, *SD* = 1.39, α = 0.81) environmental motivations.

Self-nature representations. Afterwards, participants completed the same inclusion of nature in self (Schultz, 2001; *M* = 3.98, *SD* = 1.50) and relative nature-self size (McConnell & Jacobs, 2020; *M* = 3.82, *SD* = 1.88) measures used in Study 1.

Basic values. Participants then completed a measure of self-transcendent values and self-enhancing values adapted from Schwartz (1992) and used previously by McConnell and Jacobs (2020; see also, Hansla et al., 2008). Specifically, participants reported the degree to which they endorsed 16 values on a scale ranging from 1 (not at all important) to 9 (extremely important). Eight of these items reflected the other-oriented value domains of benevolence (i.e., honesty, helpfulness, meaning in life, spiritual life) and universalism (i.e., social justice, equality, world at peace, inner harmony), and the other eight items captured the self-enhancing value domains of power (i.e., wealth, authority, social power, social recognition) and achievement (i.e., ambition, influential, success, capability). Mean responses to the eight self-transcendent values were computed to create an index of self-transcendence values (*M* = 7.48, *SD* = 1.06, α = 0.78), and the mean

responses to the eight self-enhancing values were computed to create an index of self-enhancement values (*M* = 6.62, *SD* = 1.14, α = 0.89).

Conservatism. Participants reported on their general political beliefs on a scale from 1 (very liberal) to 7 (very conservative). Next, they rated their approval of eight political issues and social groups (i.e., capital punishment, abortion, gun control, socialized healthcare, same-sex marriage, illegal immigration, Republicans, Democrats) on a scale from 1 (strongly against) to 7 (strongly in favor), based on Martens et al. (2018). The mean response was computed for all nine political items (some reverse coded) to create an index of political conservativism (*M* = 3.41, *SD* = 1.17, α = 0.85).

Pro-environmental behavior. Finally, participants completed the same measure of student pro-environmental behavior used as in Study 1 (*M* = 3.19, *SD* = 0.59, α = 0.79).

3.2. Results

3.2.1. Correlational analyses

Zero-order correlations were computed across all measures and are reported in Table 3. As in Study 1, STEs and SIEs were related (*r* = 0.73, *p* < .001) but below the threshold for discriminant validity (*r* = 0.80; Brown, 2006). Stronger STEs were associated with greater biospheric concerns, altruistic concerns, egoistic concerns, inclusion of nature in self, endorsement of both self-transcendent and self-enhancing values, and pro-environmental behavior. Also, greater SIEs were associated with greater altruistic concern, greater egoistic concern, lower relative nature-self size, greater endorsement of both self-transcendent and self-enhancing values, and greater endorsement of conservative beliefs. Unlike STEs, SIEs were not related to biospheric concern or pro-environmental behavior, replicating Study 1 as well.

Next, we examined the correlations among the other measures. Greater biospheric concern was associated with greater altruistic concern, more inclusion of nature in self, greater relative nature-self size, more self-transcendent values, less political conservatism, and more pro-environmental behavior. Greater altruistic concern was associated with greater egoistic concern, inclusion of nature in self, relative nature-self size, self-transcendent and self-enhancing values, and pro-environmental behavior. Greater egoistic concern was associated with less relative nature-self size, greater self-transcendent and self-enhancing values, and greater conservatism. Turning to self-nature representations, greater inclusion of nature in self was associated with greater relative nature-self size, greater self-transcendent values, less conservatism, and greater pro-environmental behavior. Greater relative nature-self size was associated with less self-enhancing values, less conservativism, and greater pro-environmental behavior. Participants who endorsed greater self-transcendent values reported more self-enhancing values, less conservatism, and more pro-environmental behaviors. Those who endorsed more self-enhancing values reported greater conservatism. Finally, people who endorsed greater conservatism reported performing less pro-environmental behavior.

Table 3
Study 2 zero-order correlations.

	STEs	SIEs	BC	AC	EC	INS	NSS	ST Values	SE Values	Conservative
STEs	–									
SIEs	.73**	–								
Biospheric Concern	.20**	.03	–							
Altruistic Concern	.36**	.20**	.40**	–						
Egoistic Concern	.23**	.39**	.00	.53**	–					
INS	.21**	.07	.37**	.13**	-.05	–				
NSS	.08	-.14**	.36**	.10*	-.25**	.41**	–			
ST Values	.48**	.33**	.27**	.41**	.19**	.22**	.09	–		
SE Values	.23**	.39**	.05	.11*	.36**	-.01	-.17**	.45**	–	
Conservatism	.01	.20**	-.21**	-.06	.19**	-.13*	-.26**	-.13*	.22**	–
PEB	.35**	.10	.47**	.30**	-.06	.46**	.41**	.36**	.01	-.28**

Note. STEs (self-transcendent emotions), SIEs (self-enhancing emotions), INS (inclusion of nature in self), NSS (relative nature-self size), ST Values (Self-transcendent values), SE Values (Self-enhancing values), PEB (pro-environmental behavior).
*$p < .05$, **$p < .01$.

3.2.2. Multiple regression analyses

To evaluate the primary hypothesis, multiple regression analyses were conducted for each outcome measure with STEs and SIEs entered simultaneously as predictors.[3] As Table 4 reports, greater STEs uniquely predicted greater biospheric concern, greater altruistic concern, greater inclusion of nature in self, greater relative nature-self size, greater self-transcendent values, less conservatism, and greater pro-environmental behavior. On the other hand, greater SIEs uniquely predicted less biospheric concern, greater egoistic concern, less inclusion of nature in self, less relative nature-self size, greater self-enhancing value endorsement, more conservatism, and less pro-environmental behavior. Once again, there was no evidence of multicollinearity (VIF = 2.03).

3.3. Discussion

Overall, Study 2 provided a strong replication of Study 1 while including measures of value endorsement and conservatism. Specifically, the multiple regression analyses in Study 2 borne out strikingly different patterns of predictive utility for STEs and SIEs. Specifically, greater STEs uniquely predicted more pro-environmental engagement (e.g., greater biospheric concern, more inclusion of nature in self,

Table 4
Study 2 multiple regression analyses for unique predictive utility of STEs and SIEs.

Outcome Variables	β (STEs)	SE	β (SIEs)	SE	R^2
Biospheric Concern	.37**	.13	-.23**	.11	.06**
Altruistic Concern	.45**	.09	-.12	.07	.14**
Egoistic Concern	-.11	.09	.47**	.08	.16**
INS	.33**	.14	-.17*	.12	.06**
NSS	.35**	.17	-.39**	.15	.23**
ST Values	.50**	.09	-.04	.07	.13**
SE Values	-.11	.10	.47**	.09	.16**
Conservatism	-.29**	.11	.40**	.09	.08**
PEB	.59**	.05	-.33**	.04	.18**

Note. STEs (self-transcendent emotions), SIEs (self-enhancing emotions), INS (inclusion of nature in self), NSS (relative nature-self size), ST Values (Self-transcendent values), SE Values (Self-enhancing values), PEB (pro-environmental behavior).
*$p < .05$, **$p < .01$.

viewing nature as relatively larger than the self, more pro-environmental behavior). With respect to the new measures included in Study 2, STEs uniquely predicted more self-transcendent values and less conservatism. On the other hand, greater SIEs uniquely predicted poor pro-environmental outcomes (e.g., less biospheric concern, less inclusion of nature in self, seeing nature as relatively smaller than the self, endorsing greater conservatism, performing less pro-environmental behaviors). Thus, the findings of Study 2 supported the hypotheses that STEs uniquely predict greater pro-environmental outcomes whereas SIEs uniquely predicted less pro-environmentalism.

4. Study 3: Testing relations over time and measuring actual behavior

Although Studies 1 and 2 observed a consistent, distinctive pattern of results for STEs and SIEs, it would be useful to observe the ability of STEs and SIEs to predict actual behavior in a context separate from STE and SIE measurement. Accordingly, we conducted a final study that examined pro-environmental behavior in a controlled setting weeks after STEs and SIEs were assessed by compelling participants to either recycle or trash paper documents during an experimental session (for a similar paradigm, see Cojuharenco et al., 2016). Self-nature representations, connectedness to nature, and self-reported pro-environmental behavior were also measured at Time 1 to provide further tests of the findings reported in Studies 1 and 2. In particular, Study 2 found that SIEs negatively predicted self-nature representations and pro-environmental behavior, whereas Study 1 observed that those relations were nonsignificant. Therefore, a secondary purpose of Study 3 was to provide insight regarding this inconsistency. The Connectedness to Nature Scale (Mayer & Frantz, 2004) was included to replicate Study 1 as well.

4.1. Method

4.1.1. Participants

Initially, 402 undergraduates completed a mass screening survey online composed of many different measures from several laboratories at the start of the semester (details below). Later in the semester, 194 of these individuals returned for an in-laboratory follow-up study. Target sample size ($N = 191$) was determined by an a priori sample size analysis conducted in G*Power (Faul et al., 2007), based on the small-to-moderate correlations found in Studies 1 and 2 ($r = 0.20$), 80% desired power, and oversampling slightly to account for failed attention checks in the Time 2 session. Eight participants failed attention checks, resulting in a final sample of 186 participants.

4.1.2. Time 1 measures

Dispositional positive emotions. During the mass survey session, participants completed the DPES (Shiota et al., 2006). Using the same approach from Studies 1–2, mean measures of STEs ($M = 5.08$, $SD = $

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[3] For readers who may be curious about role of values and political beliefs as third variables because of their strong relations to both emotions and pro-environmental outcomes, we report the results of additional multiple regression analyses with these covariates in the Supplemental Materials (Table S2). The results are nearly identical in terms of statistical significance, with the only change being that SIEs no longer significantly predict less INS.

0.73, α = 0.85) and SIEs (*M* = 4.88, *SD* = 0.77, α = 0.89) were calculated.

Self-nature representations. Also, participants completed the inclusion of nature in self (Schultz, 2001; *M* = 3.56, *SD* = 1.35) and relative nature-self size (McConnell & Jacobs, 2020; *M* = 4.15, *SD* = 1.87) used in Studies 1 and 2.

Connectedness to nature. Participants also completed the Connectedness to Nature Scale (Mayer & Frantz, 2004). The mean response was computed (*M* = 3.22, *SD* = 0.53, α = 0.78), with larger scores reflecting more connection to nature.

Self-reported pro-environmental behavior. Finally, participants completed the measure of pro-environmental behavior used in Studies 1–2 (*M* = 3.23, *SD* = 0.52, α = 0.73).

4.1.3. Time 2 procedure and measures

Cover story. Two to three weeks after the Time 1 session, participants were invited to complete a study conducted in an on-campus laboratory. To ensure that participants were unaware that the purpose of the Time 2 session involved pro-environmental behavior, they were told that they were participating in a study examining how attitudes towards college life predict cognitive performance. Participants completed all measures at the Time 2 session in individual small rooms. To enhance the cover study, participants first completed an 18-item self-report measure of their attitudes toward different aspects of undergraduate life (e.g., how important is it to attend every single class?). These items were included for face validity and were not analyzed.

Recycling behavior. Next, as a purported measure of cognitive abilities, participants completed a word search themed around kitchen appliances and were told that they would recall the words later in the study. Borrowing from Cojuharenco et al. (2016), a recycling bin and trash can were located in each room, and participants were told to dispose of the word search document as they saw fit once they were finished to ensure that they did not cheat on the upcoming memory task (which did not take place). After the study was completed, experimenters assessed whether participants recycled (66%) or trashed (34%) their word search documents (before recycling all of the forms).

Slogan generation task. Finally, participants were told that before performing the memory task, they would take part in a separate study on creativity and activism. In actuality, this slogan generation task provided another opportunity to assess pro-environmental behavior (Cojuharenco et al., 2016). In this task, participants read about the Environmental Defense Fund (EDF), a real nonprofit organization focused on lobbying policy makers to enact pro-environmental policies. Participants were asked to generate up to five slogans for the campaign, and they were told that they could write as many or as few slogans as they wanted (*M* = 1.60, *SD* = 1.60). Unfortunately, the distribution of responses showed low variability and normality assumptions violated (both Kolmogorov-Smirnov and Shaprio-Wilk tests were significant, *p*s < .001). Additionally, the number of slogans generated was not associated with any of the Time 1 variables (*p*s > .10). Thus, further analyses were not conducted with the slogan task measure.

4.2. Results

4.2.1. Correlational analyses

Zero-order correlations were computed for Time 1 variables and are reported in Table 5. Replicating Studies 1 and 2, STEs and SIEs were related (*r* = 0.63) but below the threshold for discriminant validity (*r* = 0.80; Brown, 2006). STEs also were associated with greater connectedness to nature and pro-environmental behavior. SIEs were only associated with greater connectedness to nature. All of the environmental outcome measures (inclusion of nature in self, relative nature-self size, connectedness to nature, and pro-environmental behavior) were significantly and positively related with each other, as expected.

Table 5
Study 3 time 1 zero-order correlations.

	STEs	SIEs	INS	NSS	CNS	PEB
STEs	–					
SIEs	.63**	–				
INS	.11	.05	–			
NSS	.11	-.02	.46**	–		
CNS	.40**	.26**	.52**	.36**	–	
PEB	.21**	.11	.32**	.33**	.43**	–

Note. STE (self-transcendent emotions), SIE (self-enhancing emotions), INS (inclusion of nature in self), NSS (relative nature-self size), CNS (connectedness to nature), PEB (pro-environmental behavior).
*p < .05, **p < .01.

4.2.2. Multiple regression analyses

To evaluate the key predictions, multiple regression analyses were conducted with STEs and SIEs entered simultaneously as predictors for each of the outcome measures, and the regression weights are presented in Table 6. Replicating Studies 1–2, STEs uniquely predicted greater relative nature-self size, greater connectedness to nature, and more self-reported pro-environmental behavior. SIEs did not uniquely predict any of the outcome variables. Once again, multicollinearity was not a concern (VIF = 1.57).

Finally, we examined the predictivity utility of STEs and SIEs at Time 1 to predict Time 2 recycling behavior. Because the recycling outcome was dichotomous, logistic regression analyses were conducted. Greater STEs uniquely predicted more recycling behavior, *B* = 0.56, *SE* = 0.28, *Exp*(β) = 1.76, 95% CI [1.02, 3.01], Wald $\chi^2(1)$ = 4.15, *p* = .042. On the other hand, SIEs did not uniquely predict recycling behavior, *B* = −0.13, *SE* = 0.26, *Exp*(β) = 0.88, 95% CI [0.53, 1.47], Wald $\chi^2(1)$ = 0.23, *p* = .629.

4.3. Discussion

Study 3 replicated and expanded the findings of the prior studies by examining if STEs and SIEs differentially predict real-world pro-environmental behavior over time. Indeed, STEs measured at the beginning the semester uniquely predicted recycling behavior in a controlled lab setting weeks later but SIEs did not. Cross-sectional analyses at Time 1 also provided replication insights into Studies 1–2. Similar to findings from the previous studies, STEs uniquely predicted greater relative nature-self size, connectedness to nature, and past conservation behavior. Further, SIEs did not show any evidence of uniquely predicting more pro-environmental outcomes. However, unlike the previous studies, STEs did not predict greater inclusion of nature in self (Studies 1–2 showed this effect). Thus, the connection between STEs and nature-self overlap may be somewhat weaker, and more research will be needed to clarify this relation. However, the significant relationship with connectedness to nature (Mayer & Frantz, 2004) suggests that STEs relate to a more general feeling of interconnectedness with the natural world.

Turning to SIEs, Study 3 found that SIEs did not significantly predict self-nature representations, connectedness to nature, past reports of pro-

Table 6
Study 3 time 1 multiple regression analyses for unique predictive utility of STEs and SIEs.

Outcome Variables	β (STEs)	SE	β (SIEs)	SE	R^2
INS	.12	.17	-.03	.17	.01
NSS	.20*	.24	-.15	.23	.02*
CNS	.39**	.06	.01	.06	.16**
PEB	.23**	.07	-.04	.06	.04*

Note. STEs (self-transcendent emotions), SIEs (self-enhancing emotions), INS (inclusion of nature in self), NSS (relative nature-self size), CNS (connectedness to nature), PEB (pro-environmental behavior).
*p < .05, **p < .01.

environmental behavior, or actual recycling behavior in the laboratory setting. These findings are consistent with Study 1 but differed from Study 2, which found that SIEs predicted less inclusion of nature in self, less nature-self size, and less past pro-environmental behavior. Despite the inconsistencies observed with SIEs in Study 2 compared to Studies 1 and 3, it is abundantly clear that in no cases did SIEs uniquely predict any outcomes that were more pro-environmental in nature.

5. General discussion

In three studies, we explored how different types of positive emotion dispositions reveal distinct relations with sustainability. Specifically, we hypothesized that having greater STEs would predict greater pro-environmental beliefs, self-nature connections, and behaviors, whereas SIEs would not but might instead predict environmentally-detrimental outcomes such as egoistic concern, conservative ideologies, and self-enhancement values. On the whole, these predictions were supported. Across multiple studies, STEs uniquely predicted greater biospheric concern, seeing nature as relatively larger than the self, greater connectedness to nature, and performing more pro-environmental behavior. Study 2 provided evidence that STEs are also uniquely tied to holding stronger other-oriented values and less endorsement of conservative political beliefs. Study 3 expanded these findings by showing that STEs uniquely predicted an ecologically valid conservation behavior (recycling) weeks after emotions were measured. Findings regarding inclusion of nature in self were less consistent, with Studies 1 and 2 finding that STEs significantly and uniquely predicted greater inclusion of nature in self whereas Study 3 did not. Study 3 is at odds with past research reporting that STEs are related to a more expansive self-concept including nature (McConnell & Jacobs, 2020; Shiota et al., 2007), whereas Studies 1 and 3 both found that STEs uniquely predicted connectedness to nature (Mayer & Frantz, 2004). Thus, it is likely that STEs are related to a general sense of belonging with nature despite the one nonsignificant finding (Study 3) involving inclusion of nature in self.

The findings for SIEs clearly supported the expectation that these self-interested emotions do not show unique relations with stronger pro-environmental outcomes, with findings either in the opposite direction of STEs or nonsignificant in nature. Study 2 found that SIEs uniquely predicted *less* biospheric concern, more egoistic concern, *less* inclusion of nature in self, viewing nature as relatively *smaller* than the self, and performing *fewer* pro-environmental behaviors, although these relations were nonsignificant in Studies 1 and 3. Despite the mixed pattern of results for SIEs, in no case did SIEs independently predict sustainable beliefs, values, self-nature representations, or behaviors. Furthermore, Study 2 found that SIEs uniquely predicted greater self-enhancement values and more conservative political beliefs, both of which predict anti-environmental outcomes such as climate change denial and less pro-environmental behavior (Schultz et al., 2005; Whitmarsh, 2011). This starkly different pattern for SIEs, compared to STEs, indicate that not all positive emotions have the same relations with sustainability and further underscore the importance of examining discrete positive emotions in understanding human behavior (Shiota et al., 2017; Tracy, 2014). Moreover, it is clear that STEs and SIEs conceptually capture fundamentally different views of nature, other-oriented values, political ideologies, and environmentally-responsible behaviors.

A key contribution of the current work is to shed light on the failure of past research to consistently find a link between positive affect and pro-environmental behavior. Although many studies have found that general positive affect predicts greater sustainability (Chatelain et al., 2018; Kasser, 2017), other research has failed to support this relation (e. g., Lange & Dewitte, 2020; Wang et al., 2018). The current research suggests that one reason for this inconsistency is that not all types of positive affect have the same relations with conservation. As hypothesized, STEs and SIEs demonstrated different unique relations with pro-environmental behavior despite sharing positive valence. Indeed, in all three studies, STEs and SIEs were strongly related. This shared

variance is expected because people, especially in Western cultures, typically report generally high levels of positive emotions (Diener et al., 2014; Lucas et al., 2003) and positive emotion dispositions tend to be significantly associated with each other (Dixson et al., 2018; Shiota et al., 2006). However, the focus of the current research was not to show that these two types of emotion are categorically independent (generally, even positive emotions that are considered to be discrete still share overlapping features; Shiota et al., 2014). Instead, we used a functional approach to emotion (Keltner & Lerner, 2010; Shiota et al., 2014) based on theory (Stellar et al., 2017; Zelenski & Desrochers, 2021) to suggest that STEs and SIEs are linked to different motives (helping others and benefitting the self, respectively) that should predict different outcomes (e.g., beliefs, behaviors) in the domain of sustainability.

Using multiple regression analyses allowed us to examine the predictive utility of one emotion type while controlling for the other emotion type, permitting a more precise test (Marill, 2004) of our hypotheses that STEs and SIEs reflect different aspects of pro-environmentalism. Moreover, the current work suggests that contexts where STEs or SIEs are triggered (e.g., a moment of awe on vacation, an experience of pride at work) could push people in markedly different directions in terms of sustainability, although additional research is needed to experimentally test this proposition. Thus, we contend that future work should focus on exploring the effects of specific types of positive emotion on environmental outcomes rather than broadly measuring positive affect. This approach is consistent with a growing body of research examining how different families of positive emotions may have unique behavioral and cognitive consequences beyond those associated with happiness or general positive affect (see Shiota et al., 2017).

Another interesting implication of this work is how STEs and SIEs seem to be related to different value systems that underlie how people interact with the social and natural world. Although scholars have theorized that STEs drive greater other-focus and that SIEs drive greater self-focus (Haidt, 2003; Stellar et al., 2017), no other known research has investigated this hypothesis in terms of basic values. In the current work, Study 2 found that STEs uniquely predicted greater endorsement of self-transcendent values and SIEs instead uniquely predicted greater endorsement of self-enhancement values. These findings indicate that STEs are related to interacting with the world prioritizing the needs of others whereas SIEs are instead related to prioritizing self-esteem and personal power (Schwartz, 1992). Not only do these findings have implications for environmental action, but this presumed connection between emotions and values also suggests that STEs and SIEs should have broader effects on prosocial and selfish behavior, respectively. Future work should explore these possibilities and further examine the underpinnings of the relations between emotions, values, and prosociality. For example, it could be that endorsing self-transcendent values leads people to experience more STEs, which then leads to greater prosociality, or it could be that experiencing STEs leads people to develop a more self-transcendent value system, which then drives prosocial behavior. The idea of emotions causing changes in values is congruent with the Social Intuitionist Model of Morality (Haidt, 2001), which argues that emotions are the primary driver of moral beliefs and ideals such as values. Further, Moral Foundations Theory (Graham et al., 2013) proposes that moral emotions (including STEs) play a crucial role in the development of the moral foundations that underlie political beliefs. Thus, two leading theories support the possibly of STEs and SIEs underlying value systems and political beliefs, and future research should explore these possibilities.

Because basic values vary between cultures (Schwartz, 1999), we would also anticipate cultural differences in emotion dispositions such that people in cultures that prioritize self-transcendence should show more STEs whereas people in cultures that value self-enhancement should instead show more SIEs (Tsai, 2007). This would also be congruent with Markus and Kitayama's (1991) prediction that people in interdependent cultures should experience more other-focused emotions

whereas people in independent cultures should experience more self-focused emotions (see also, Kitayama et al., 2006). These hypothesized cultural differences could also explain how people develop differences in their dispositional emotions, because people are more likely to express emotions that are focal or ideal in their culture (Mesquita, 2003; Tsai, 2007).

In addition to the primary focus on emotions, secondary analyses also examined relations between other important pro-environmental factors. First, we investigated the role of self-nature representations. Both greater inclusion of nature in self and greater relative nature-self size were associated with greater biospheric concern, connectedness to nature, and more self-reported pro-environmental behavior. Additionally, greater relative nature-self size was associated with less egoistic concern and less endorsement of self-enhancing values, whereas inclusion of nature in self was not significantly related with these outcomes. These findings regarding self-nature representations replicate the findings of McConnell and Jacobs (2020) that both nature-self inclusion and size play a meaningful role in predicting pro-environmental outcomes. Readers also may wonder about the causal direction of the relation between STEs and nature-self size. Although the current data cannot answer this question, past work suggests that this relation may be bidirectional. For example, Piff et al. (2015) found that feeling awe in nature leads to self-diminishment (STEs affecting size), and McConnell and Jacobs (2020) found that inducing greater nature-self size leads to more awe, compassion, and love (size affecting STEs).

Second, we examined whether biospheric and egoistic concern were differentially related to pro-environmental outcomes. As in past research (Mayer & Frantz, 2004; Schultz, 2001; Schultz et al., 2004), biospheric concern was significantly associated with greater self-reported conservation behavior and connectedness to nature. Egoistic concern was not significantly associated with these outcomes. These findings are congruent with research on environmental motivations (de Groot & Steg, 2008; Schultz, 2001), although different from some past research that observed negative relations between egoistic motivations and pro-environmental behavior (i.e., Schultz et al., 2004). Finally, Study 2 revealed intriguing relations between conservatism and environmental outcomes. Greater endorsement of politically-conservative beliefs predicted less biospheric concern, less inclusion of nature in self, seeing the self as relatively larger than nature, less endorsement of self-transcendent values, and less pro-environmental behavior as well as greater egoistic concern and endorsement of self-enhancement values. These findings add to existent work showing that conservative ideologies predict environmentally-harmful behaviors and beliefs (Cruz, 2017; McCright & Dunlap, 2011; Whitmarsh, 2011) as well as demonstrating relations with self-nature representations that should be explored in future research.

Although the current work supports the important distinctions between STEs and SIEs for nature connectedness and pro-environmental behavior, several limitations apply to this work. First, all three studies used correlational designs, which limits claims about causal effects of STEs on increasing pro-environmental behavior. However, past research supports a causal relationship between individual self-transcendent emotions such as awe and compassion on sustainable behavior (i.e., Geiger & Keller, 2018; Lu & Schuldt, 2016; Pfattheicher et al., 2016; Yang et al., 2018; Zhao et al., 2018). Nonetheless, additional experimental research is needed to examine the class of STEs as a whole for revealing a causal effect on greater sustainability as well as SIEs possibly having a negative effect for pro-environmental outcomes. Second, the current research only examined emotion dispositions and did not measure state emotions. Although trait and state emotions usually have similar effects on behavior and cognition, there can be differences (Rosenberg, 1998; Rosenberg et al., 2001). Thus, future research should explore whether findings with state measures produce similar results.

A third limitation is that we did not examine the complete range of self-transcendent emotions. We focused on awe, compassion, and love because these are the STEs that have received the most attention, both in the sustainability literature (e.g., McConnell & Jacobs, 2020; Perkins, 2010; Zelenski & Desrochers, 2021) and in the study of discrete positive emotions (Griskevicius et al., 2010; Piff & Moskowitz, 2018; Shiota et al., 2006, 2014). However, moral elevation and gratitude are also STEs that should be relevant for sustainability. Moral elevation is the feeling of being moved or inspired by a morally virtuous entity (Haidt, 2003). For instance, Moreton et al. (2019) found that inducing moral elevation led to greater connectedness to nature, but those authors only found indirect effects on conservation behavior. Also, gratitude is the positive feeling of freely receiving a benefit from another entity (Emmons et al., 2019, pp. 317–332). A recent study by Kates and DeSteno (2021) found that inducing gratitude increased sustainable resource use in a commons dilemma game, whereas general positive affect did not. Similarly, Syropoulos et al. (2020) found that trait gratitude predicted greater pro-environmental behavioral intentions via feelings of responsibility for future generations. This work suggests that dispositional gratitude relates to other-orientated concerns, similar to how STEs related to self-transcendent values in the current work. Thus, because both gratitude and elevation seem to have some positive relations to sustainability and relative other-focus, they should be considered in future STE research. A final limitation is that all three studies used student samples, and future work should examine more diverse populations to enhance generalizability and to account for particular characteristics of college samples, such as greater environmental concern and liberal political beliefs (Clements, 2012; Henrich et al., 2010).

To conclude, three studies found that different types of positive emotion dispositions predict pro-environmental outcomes in divergent ways. Self-transcendent emotion dispositions uniquely predicted more nature connections and more pro-environmental behaviors and beliefs, whereas self-interested emotion dispositions did not predict these outcomes and at times predicted less of them. This work emphasizes the importance of investigating different types of positive emotions rather just examining positive affect or happiness in sustainability research. In sum, we hope the current work establishes a broader and more interconnected foundation to motivate future research on leveraging emotions to bridge the gap from environmental concern to environmental action.

CRediT author statement

Tyler P. Jacobs: Conceptualization, Methodology, Formal analysis, Data Curation, Writing - Original Draft, Writing - Review & Editing, Visualization, Project administration.

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Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jenvp.2022.101797.

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