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Assessing the Dynamic amongst Self-compassion, Connection to Nature, and Well-Being

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by

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Honor Pledge: I pledge that I have neither received nor given unauthorized assistance during

the completion of this work.

Assessing the Dynamic amongst Self-compassion, Connection to Nature, and Well-Being

In 2015, the United Nations deemed promoting individual well-being of paramount importance, along with seventeen other sustainable development goals (to be achieved by 2030). Unfortunately, overall mental health has taken sharp declines with the unprecedented onset of the COVID-19 pandemic (OECD, 2021). According to a report from the Organization for Economic Cooperation and Development (OECD), the prevalence of anxiety and depression has increased globally; it has doubled or more than doubled as compared to previous years (OECD, 2021). The Centers for Disease Control and Prevention (CDC) has reported increasing levels of adverse mental health conditions, substance use, and suicidal ideation in the United States (Czeisler, 2020). The socially detrimental effects of the COVID-19 pandemic have caused people to place greater emphasis on prioritizing and restoring mental health, which the World Health Organization defines as "a state of well-being in which the individual realizes his or her own abilities, can cope with the normal stresses of life, can work productively and fruitfully, and is able to make a contribution to his or her community" (World Health Organization, 2004, p. 12). In light of this context, with the goal to improve people's mental health, it is essential that psychology researchers strive to understand factors that may contribute to well-being. In this study, I examined the relationships amongst connection to nature, self-compassion, and well-being.

Self-Compassion

Self-compassion was operationalized by Dr. Kristen Neff based on how compassion for others was conceptualized in Buddhist philosophy, following the increasing conversations between Eastern philosophy and Western psychology (Neff, 2003). Compassion involves being open towards the suffering of others, desiring to ease their suffering, as well as offering kindness

and nonjudgmental understanding to them while recognizing that all humans are imperfect in nature and making mistakes is inevitable. Closely related to the definition of compassion, self-compassion is compassion directed inward: "being open to and moved by one's own suffering, experiencing feelings of caring and kindness toward oneself, taking an understanding, nonjudgmental attitude toward one's inadequacies and failures, and recognizing that one's own experience is part of the common human experience" (Neff, 2003, p. 224). Self-compassion refers to a relationship between people and themselves when encountering perceived failure, inadequacy, and personal suffering. Neff (2003) identified literature which suggests that people are harsher on themselves compared to others and use a metaphor of giving the same care and kindness to yourself as you will give to a good friend to illustrate this construct. The more recent research on self-compassion further situated the construct in a bipolar continuum ranging from uncompassionate self-responding (self-judgment, isolation, and over-identification) to compassionate self-responding (self-kindness, common humanity, and mindfulness), so that higher self-compassion scores represent increased compassionate self-responding and reduced from uncompassionate self-responding (Neff, 2022).

Self-compassion entails three basic components, including being kind and understanding to oneself rather than engaging in harsh self-criticism, seeing one's experiences and adversity as part of the common human experience as a whole rather than isolating and separating the self from others, and being aware of one's painful thoughts and feelings as they are rather than over-identifying them as the truth (Neff et al., 2007). The three elements overlap with each other but are conceptually distinct. While Neff discussed self-compassion in terms of three components, each component is comprised of two sub-components, which yields a total of six subscales in the self-compassion measure (Neff, 2016). In the self-compassion short form, the six subscales--

Self-Kindness, Self-Judgement, Common Humanity, Isolation, Mindfulness, Over-Identification-

-intercorrelated with each other from a range between $r = 0.25$ to $r = 0.66$, with most of the

correlations fall between $r = 0.4$ to $r = 0.5$ (Raes et al., 2011). See Table 1 for a summary of the

three components of self-compassion.

Table 1

Name, Descriptions, and Sample Items for the Three Components of Self-Compassion

Name of the element	Description of the element	Sample item from the subscale
Self-Kindness	Being kind and understanding to oneself rather than engaging in harsh self-criticism	Self-Kindness: "When I'm going through a very hard time, I give myself the caring and tenderness I need."
		Self-Judgment: "I'm disapproving and judgmental about my own flaws and inadequacies."
Common Humanity	Seeing one's experiences and adversity as part of the common human experience as a whole rather than isolating and separating the self from others	Common Humanity: "I try to see my failings as part of the human condition."
		Isolation: "When I'm really struggling, I tend to feel like other people must be having an easier time of it."
Mindfulness	Being aware of one's painful thoughts and feelings as they	Mindfulness: "When something painful happens I try to take a balanced view of the situation."

	are rather than over-identifying them as the truth	Over-identification: "When something painful happens I tend to blow the incident out of proportion."

Three Elements of Self-Compassion

Self-Kindness Versus Self-Judgment. The first element of self-compassion involves acknowledging one's shortcomings but taking care of oneself regardless of them. Self-kindness includes being emotionally available when encountering challenging life events and taking a supportive and benevolent attitude towards oneself rather than condemning oneself coldly. Self-kindness goes beyond ending self-criticism as people will actively show concern for their distress and ease their discomfort. For example, when people are experiencing a painful situation, they may stop and ask, "This is very hard for you. How can I take care of myself at this moment?" People will feel supported and encouraged in a similar way as they feel when they receive kindness from others.

Common Humanity Versus Isolation. Common humanity highlights how self-compassion helps people to feel connected rather than isolated from others. When experiencing perceived failures and inadequacy, as an emotional reaction, people tend to think they are the only ones who are suffering and forget that part of being human means being vulnerable (Neff, 2022). Even for the happening of a challenging life event that people have no control over, they tend to feel that other people are having an easier time experiencing it compared to them. Due to these reactions, people's ability to understand the situations and reality is undermined and resulting in a sense of disconnection and loneliness which exacerbates the suffering. Self-compassion helps people be in touch with humanity and recognize that suffering is a part of

being human that is shared by all: while the riggers, circumstances, and degree of pain are different, the experience of imperfection is shared by all humans. As a result, the feelings of isolation and loneliness are reduced.

Mindfulness Versus Over-Identification. Acknowledging the pain mindfully--an awareness "that neither avoids nor exaggerates the discomfort of our present-moment experience"--is essential for having compassion (Neff, 2022, p. 74). The ability to engage in mindfulness allows people to step outside themselves and adopt the perspective needed. On the contrary, when trying to resist suffering, people may be overly identified with negative and racing thoughts. Over-identification involves reifying a present and momentary experience so that a transitory event is definitive and permanent. Over-identification causes people to narrow their focus and exaggerate the negative and unhealthy implications of their thoughts for self-worth. For example, when something terrible happens, an over-identification reaction is to think life is horrible and internalize it to the self. With mindfulness people can recognize the negative thoughts and feelings as what they are but not fact. As a result, they are less absorbed by the negative reaction and therefore have the opportunity to extend compassion for the difficulties.

Self-Compassion and Well-Being

Previous research has indicated the positive impacts of self-compassion on well-being related factors. Since the operational definition of the construct and the scale to measure it was published in 2003 by Dr. Kristen Neff, research on self-compassion has grown at an exponential rate. By 2023, there are now over 4,000 journal articles and dissertations focused on self-compassion and much of the emerging literature stated the association between self-compassion and positive well-being outcomes (Neff, 2023).

Most of the studies on self-compassion are correlational with the self-report measure, the Self-Compassion Scale (Neff, 2003a), which demonstrated greater self-compassion was found to be associated with markers of mental health. Self-compassion is found to be positively associated with direct measures of well-being, such as subjective happiness, psychological well-being, meaning in life, positive and negative affect, as well as ego integrity (McKay & Walker, 2021; Phillips & Ferguson, 2013). Besides, self-compassion was negatively correlated with rumination and thought suppression, pointing out that carrying away or suppressing emotions were not aspects of self-compassion (Neff, 2003). In a cross-cultural study, self-compassion was significantly associated with less depression and greater life satisfaction in Thailand, the United States, and Taiwan, even though self-compassion levels differed across cultures (Neff et al., 2008). According to Neff (2003), self-compassion is also negatively correlated with anxiety and depression, and positively correlated with life satisfaction, suggesting self-compassion may be an adaptive process thereby increasing psychological resiliency. However, no study has investigated the connections of the facets of self-compassion with other constructs.

More and more research has started to use experimental manipulations, interventions, and qualitative methods to investigate self-compassion. In Neff et al. (2007), participants completed the self-compassion scale as well as measures of several mental health variables one week prior to and three weeks after their participation in the Gestalt two-chair exercise. The "two-chair" exercise was an intervention created to increase participants' ability to be more empathic towards themselves by challenging self-critical beliefs. The results indicated that participants who experienced increasing self-compassion as a result of the exercise experienced increasing social connectedness and decreased self-criticism, depression, and anxiety. In addition, when participants were asked to take part in a mock job interview in which they were asked to

"describe their greatest weakness," people with higher levels of trait self-compassion were less likely to experience anxiety as a result, even though they used as many negative self-descriptors as those low in self-compassion (Neff et al., 2007). In a study using a qualitative method, a thematic analysis, the results indicated that self-compassion facilitates "positive self-regard, forgiveness, self-efficacy, resilience, hope, optimism, well-being, perceived self-efficacy, autonomy, competence, intellectual and emotional potential, productivity, recurrence of positive emotions and decreased stress" (Tiwari et al., 2020, p. 550).

The physiological processes underlying the connection between self-compassion and well-being, as suggested by Gilbert and Irons (2005), may be that self-compassion deactivates the threat system and activates the self-soothing system. While the threat system is associated with self-criticism, insecure attachment, and defensiveness, the self-soothing system is associated with secure attachment, safety, and the oxytocin-opiate system. As a result, self-compassion may foster an emotional balance through the biological processes accompanying increased feelings of safety and interconnectedness and decreased feelings of threat and isolation (Neff, 2023).

Connection to Nature

Mayer and Frantz (2004) delineate connectedness to nature as the "individual's experiential sense of oneness with the natural world" (p. 504). Connection to nature is people's subjective sense and consciousness of feeling emotionally connected to the natural world. Different from the direct contact with nature, connection to nature is a personality construct and an individual's trait that has between-person differences. Relatedly, a science of balanced living between human beings and nature, ecopsychology, was put forward by a group of psychologists (Teerapong et al., 2021). Ecopsychology combines the sciences of ecology and psychology to

investigate ways to develop a lifestyle that balances both ecological and psychological perspectives. Connection to nature is a key concept in ecopsychology which consists of the cognitive, affective, and experiential connection people have with nature (Teerapong et al., 2021)

Connection to Nature and Well-Being

Past research has demonstrated the beneficial effects of a connection to nature on well-being (Schutte & Malouff, 2018). Artuta (2021)'s review indicated that a greater sense of affiliation with nature is associated with positive psychological and health effects, such that there are enhanced psychological well-being, social well-being, positive affect, subjective well-being, eudaimonic well-being, and life satisfaction when the instinctive human need to connect with nature is fulfilled. Zelenski and Nisbet (2014) found that the personality construct of subjective connection with nature correlated with most well-being indicators. Connection to nature remained an independent predictor when controlling for other sources of connections, such as with family, friends, and culture, under regression analyses. According to a meta-analysis by Capaldi et al. (2014) that covered thirty samples, which also conceptualized connection to nature as a trait-like between-person difference, connectedness to nature was associated with more positive affect, greater vitality, and higher life satisfaction. Behaviorally, people with a higher trait of connection to nature are likely to spend more time in nature, which also has positive well-being implications. For example, outdoor education programs have found that the experiences of being in the wild boost personal well-being, such as personal growth, self-esteem, and social competency (Teerapong et al., 2021). In another meta-analysis article of 32 experimental studies with more than 2,000 subjects, the results suggest that connection to nature enhances positive moods and decreases negative feelings (McMahan & Estes, 2015).

Psychophysiological Stress Recovery is a theoretical framework that might explain the associations between connection to nature and well-being (Baceviciene et al., 2021). Almost all of human's evolutionary history was spent in a natural environment and it was only the recent times that human transitioned to urban living (Kellert & Wilson, 1993). As a result, shaped by evolution, humans may have the intrinsic tendency and desire to connect to nature and benefit from the connections (Schutte & Malouff, 2018). According to the Psychophysiological Stress Recovery Theory, due to this evolutionary history, people's stress is reduced by enhancing positive emotions and supporting the parasympathetic nervous system when they are in a close relationship with natural environments.

Connection to Nature and Self-Compassion

While no study has examined the direct association between connection to nature and self-compassion, several studies provide evidence for how these two constructs might be highly related, particularly via the common humanity and mindfulness elements of self-compassion.

Passmore and Howell (2004) introduced the idea of Eco-Existential Positive Psychology, a perspective that highlights how people's experiences with nature play a fundamental role in addressing the existential anxieties that include identity, happiness, isolation, meaning in life, freedom, death, and increasing a sense of common humanity. According to the Eco-Existential Positive Psychology perspective, connection to nature reduces a sense of isolation and increases a sense of relatedness and social connectedness. When people experience the natural world, they will feel like they are a part of a functioning system and belong to something larger than themselves. As a result, a sense of separateness that many people feel is reduced and a sense of connection is created. This function of connection to nature aligns with the common humanity

element of self-compassion, as the ultimate goal of common humanity is to make people feel connected rather than separated from one another.

Scholars have speculated the theoretical basis for why nature connection improves mindfulness. One perspective stated that while immersing in nature, people's senses are enhanced thus fostering mindfulness (Howell et al., 2011). This perspective is derived from the state of mind of a naturalist: a person who goes into the wild nature will be able to close their wandering mind to just situate themselves in the time and space as the natural elements around them all press in on the senses such that small details like the sound of insects and different shades of green all grow in significance. A meta-analysis study that includes 12 samples and 2435 individuals consolidated the significant relationship between mindfulness and connection to nature with a weighted effect size of $r = 0.25$ (Schutte & Malouff, 2018). This study also found that studies with older and community participants showed a stronger association compared to students' samples. Howell et al. (2011)'s study also suggested that mindfulness significantly correlated with nature connectedness.

Hypotheses

I hypothesized that greater connection to nature would be associated with higher levels of self-compassion. More specifically, higher levels of connection to nature would be associated with higher levels of common humanity and mindfulness elements of self-compassion. This hypothesis is based on the past evidence that suggests a potential association between connection to nature and common humanity and mindfulness. I also hypothesized that connection to nature and self-compassion would independently predict well-being. This hypothesis is based on the past evidence that suggest self-compassion and connection to nature both have positive mental health implications. See Figure 1 for the hypothesized relationships amongst self-compassion,

connection to nature, and well-being. These hypotheses, as well as the study design and plan of analysis, were pre-registered on Open Science Framework: https://osf.io/3r4fq.

Figure 1

Hypothesized Relationships amongst Self-Compassion, Connection to Nature, and Well-Being
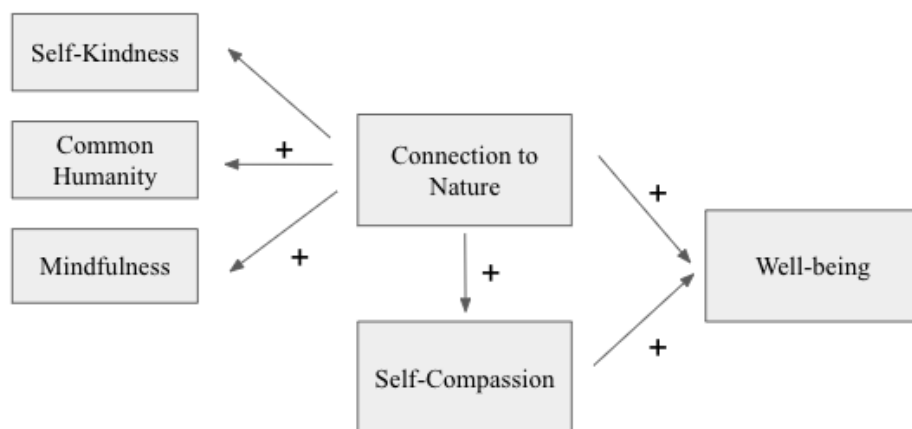
Method

The study design was pre-registered on Open Science Framework: https://osf.io/3r4fq.

Participants

Sample size was determined by the amount of funding available to offer participants an appropriate level of monetary compensation for a study of this nature and set in advance at 100 participants. There were 100 participants in total (48% female, 51% male, and 1% transgender male). They have an average age of 37.75 years old ($SD = 10.91$), with a maximum age of 70 years old and a minimum age of 18 years old. Among all participants, 72% are White/Caucasian, 12% are Black/African American/African, 10% are Latino(a)(x)/Hispanic, 9% are Asian, 1% are Native American. The percentages total is greater than 100% because participants could choose all that apply.

Measures

      Well-Being. All fourteen items from the Mental Health Continuum-Short Form (MHC-SF; Keyes, 2009), which is also referred to as the Flourishing Scale, were used to assess well-being, including items such as "In the past month, how often did you feel that you liked most parts of your personality." Responses were measured on a 6-point scale ranging from *never* (1) to *every day* (6). The scale has been shown to have good internal ($\alpha = 0.89$) and test-retest reliability in past research (Lamers et al., 2011). In this study, responses were averaged together to create a single composite in which higher scores indicated greater well-being and internal consistency of the scale in this sample was excellent ($\alpha = .96$).

      Connection to Nature. All fourteen items from the connectedness to nature scale (CNS; Mayer & Frantz, 2004) were used to assess connection to nature, including items such as "I often feel a sense of oneness with the natural world around me" and "I often feel disconnected from nature" (reverse-scored). Responses were measured on a 5-point scale ranging from *strongly disagree* (1) to *strongly agree* (5). The scale has been shown to have good internal ($\alpha = 0.82$) and test-retest reliability in past research (Mayer & Frantz, 2004). In this study, after reverse-scoring the necessary items, responses were averaged together to create a single composite in which higher scores indicated a greater connection to nature. Internal consistency in this sample was good ($\alpha = .80$).

      Self-Compassion. All twelve items from the Self-Compassion Scale-Short Form (SCS-SF; Raes et al., 2011) were used to assess self-compassion, including items such as "When I fail at something important to me I become consumed by feelings of inadequacy" (reverse-scored) and "I try to be understanding and patient towards those aspects of my personality I don't like." The scale has six subscales with two items each: Self-Kindness, Self-Judgement, Common

Humanity, Isolation, Mindfulness, Over-Identification. Responses were measured on a 5-point scale ranging from *almost never* (1) to *almost always* (5). The scale has been shown to have good internal and test-retest reliability in past research (Neff, 2003; Neff, 2016). In this study, there were two sets of scores calculated using this measure: one single composite indicating the overall self-compassion score, and three components of self-compassion (each component involves two subscales). First, after reverse-scoring the necessary items, responses were averaged together to create a single composite in which higher scores indicated greater self-compassion and internal consistency of the scale in this sample was excellent ($\alpha = .93$). Second, after reverse-scoring items for Self-Judgement, Isolation, and Over-Identification, the self-kindness component of self-compassion was measured by the average of total score of Self-Kindness items and Self-Judgement items ($\alpha = .86$). The common humanity component of self-compassion was measured by the average of total score of Common Humanity items and Isolation items ($\alpha = .86$). The mindfulness component of self-compassion was measured by the average of total score of Mindfulness items and Over-Identification items ($\alpha = .75$). Internal consistency for all three subscales was adequate.

Exploratory Measures

Gratitude. Sixteen items from the Gratitude Resentment and Appreciation Scale Short Form (GRAS-SF; Watkins et al., 2003) were used to assess gratitude, including items such as "Life has been good to me" and "There never seems to be enough to go around and I never seem to get my share" (reverse-scored). Responses were measured on a 9-point scale ranging from *I strongly disagree* (1) to *I strongly agree with the statement* (9). The scale has been shown to have good internal ($\alpha = 0.92$) in past research (Watkins et al., 2003). In this study, after reverse-scoring the necessary items, responses were averaged together to create a single composite in

which higher scores indicated greater gratitude and internal consistency of the scale in this sample was adequate (α = .70).

Cognitive Fusion. Seven items from the Cognitive Fusion Scale (CFS; Gillanders et al., 2014) were used to assess cognitive fusion, including items such as "My thoughts cause me distress or emotional pain". Responses were measured on a 7-point scale ranging from *never true* (1) to *always true* (7). The scale has been shown to have good internal (α = 0.90) and test-retest reliability in past research (Gillanders et al., 2014). In this study, responses were averaged together to create a single composite in which higher scores indicated greater cognitive fusion and internal consistency of the scale in this sample was excellent (α = .98).

Awareness of Nature. Seven items from the Spirituality Scale (SS; Delaney, 2005) were used to assess awareness of nature, including items such as "I believe there is a connection between all things that I cannot see but can sense". Responses were measured on a 6-point scale ranging *strongly agree* (1) to *strongly disagree* (6). The scale has been shown to have good internal (α = 0.81) and test-retest reliability in past research (Delaney, 2005). In this study, responses were averaged together to create a single composite in which higher scores indicated a greater awareness of nature and internal consistency of the scale in this sample was excellent (α = .90).

Perceived stress. Fourteen items from the Perceived Stress Scale (PSS; Cohen et al., 1983) were used to assess perceived stress, including items such as "In the last month, how often have you been upset because of something that happened unexpectedly" and "In the last month, how often have you dealt successfully with irritating" (reverse-scored). Responses were measured on a 4-point scale ranging from *never* (1) to *very often* (4). The scale has been shown to have good internal (α = 0.85) and test-retest reliability in past research (Cohen et al., 1983). In

this study, after reverse-scoring the necessary items, responses were averaged together to create a single composite in which higher scores indicated a greater perceived stress and internal consistency of the scale in this sample was excellent ($\alpha = .93$).

Procedure

This study took place on the semester of Spring 2023. Participants will be recruited via Connect (https://www.cloudresearch.com/products/connect-for-researchers/) for a study on "Psychological well-being." The instruction to participants includes "The purpose of this study is to learn more about people's experience with well-being and relevant factors, such as self-compassion, and connection to nature. If you agree to participate, you will be asked about your experiences of well-being, self-compassion, and connection to nature as well as a few questions describing yourself. The study should take approximately 15 minutes to complete." Eligible participants must be 18 years of age or older. Participants were allowed to use cellphone, computer, or laptop to complete the survey. Each participant completed a battery of measures including MHC-SF, CNS, SCS-SF, GRAS-SF, CFS, SS, PSS, and demographic information, such as age, race, gender, and income. This study was approved by the University of Richmond Institutional Review Board (IRB). All participants provided informed consent before starting the study and were debriefed about the study after completing the survey. During the survey, there were two attention checks. The first one asked participants to type "psychology" in a blank provided and the second one asked participants to select 3 in a multiple choice question where number one through four was listed as answers. All participants who completed the survey passed the attention check. All participants in this survey, regardless of the attention check results, were paid with five dollars on Connect.

Plan of Analysis

Study pre-registration is available on Open Science Framework: https://osf.io/3r4fq.

Hypothesis 1: Connection to nature will predict higher levels of self-compassion. More specifically, higher levels of connection to nature will be associated with higher levels of common humanity and mindfulness elements of self-compassion. I used Pearson's *r* correlation analyses (one-tail test) to evaluate Hypothesis 1. I expected two statistically significant main effects for connection to nature and two components of self-compassion, such that those who had higher connection to nature would report higher overall level of self-compassion, as well as higher level of the two components: common humanity and mindfulness.

Hypothesis 2: Connection to nature and self-compassion independently predict well-being. I used Pearson's *r* correlation (one-tail test) and a hierarchical multiple regression to evaluate hypothesis 2. For Pearson's *r* correlation (one-tail test), I expected two statistically significant main effects for connection to nature and self-compassion, such that those who had higher connection to nature and higher level of self-compassion would report higher level of well-being. For hierarchical multiple regression, I planned to put self-compassion to the analysis first and I expected a statistically significant effect for self-compassion on well-being. After this step, I planned to add connection to nature to the analysis as the second variable and I expected a statistically significant r square change, indicating connection to nature predicts well-being above and beyond self-compassion. Then, I would reverse the order of entry and expected the same results to show independent prediction.

Departures from Pre-Registration

Although I planned to recruit participants from CloudReserach on Mechanical Turk, due to unexpected technical difficulties that could not be resolved in a timely manner, I chose to use

Connect to recruit participants. All participants on Connect are from the United States so I did

not screen out any participants from the study.

Results

Descriptive statistics and correlations for all variables of interest are reported in Table 2.

To summarize, as hypothesized, higher levels of connection to nature are associated with higher

levels of common humanity ($r = .48$ $p < .001$) and mindfulness ($r = .27, p = .007$) elements of

self-compassion. In addition, higher levels of connection to nature are also associated with

higher levels of self-kindness ($r = .40, p < .001$) element of self-compassion as well as overall

self-compassion ($r = .41, p < .001$).

A two-stage hierarchical multiple regression was conducted with well-being as the

dependent variable. Connection to nature was entered at stage one of the regression to control for

connection to nature. Self-compassion was entered at stage two. The hierarchical multiple

regression revealed that, connection to nature contributed significantly to the regression model, F

$(1, 98) = 19.70, p < .001$ and accounted for 17% of the variation in well-being. Introducing the

self-compassion variable explained an additional 36 % of variation in well-being and this change

in R^2 was significant, $F (1, 97) = 73.21, p < .001$. Another two-stage hierarchical multiple

regression was conducted with well-being as the dependent variable. Self-compassion was

entered at stage one of the regression to control for Self-compassion. Connection to nature was

entered at stage two. The hierarchical multiple regression revealed that, self-compassion

contributed significantly to the regression model, $F (1, 98) = 101.63, p < .001$ and accounted for

50.9% of the variation in well-being. Introducing the connection to nature variable only

explained an additional 1.6% of variation in well-being and this change in R^2 was not significant,

$F (1, 97) = 3.36, p = .07$.

Table 2

Descriptive Statistics and Correlations

Variable	Self-compassion	Self-kindness	Common humanity	Mindfulness	Connection to nature	Well-being
Self-compassion	**3.09 (0.93)**					
Self-kindness	.96*	**3.03 (1.05)**				
Common humanity	.95**	.87**	**2.94 (1.05)**			
Mindfulness	.91**	.81**	.80**	**3.29 (0.86)**		
Connection to nature	.41**	.40**	.48**	.27**	**4.03 (0.75)**	
Well-being	.71**	.66**	.71**	.64**	.44**	**3.68 (1.28)**

Note. Means and standard deviations (in parentheses) appear in bold along the diagonal.

Correlations between variables appear below the diagonal. ** $p < .001$

Table 3

Hierarchical Multiple Regression Results

Predictors	F	ΔR^2	*p*
Step 1: Nature	19.70	17%	< .001
Step 2: Nature, Self-compassion	73.21	36%	< .001
Step 1: Self-compassion	101.63	51%	< .001
Step 2: Self-compassion, Connection to nature	3.36	1.6%	= 0.07

Discussion

As expected, hypothesis one is supported such that greater connection to nature is associated greater overall self-compassion as well as all three components of self-compassion: self-kindness, common humanity, and mindfulness. Hypothesis two is also partially supported such that greater self-compassion and connection to nature are both associated with greater well-being. However, using hierarchical multiple regression, only self-compassion uniquely predicts

higher levels of well-being while connection to nature's unique prediction of greater well-being is marginally significant. Thus, self-compassion may partially explain the relationship between connection to nature and greater well-being. In other words, a deeper connection to nature may promote well-being because it increases people's compassion toward themselves.

The current study supports past research that demonstrated the positive impacts of self-compassion on well-being related factors (Neff, 2003; Neff et al., 2007; Neff et al., 2008; McKay & Walker, 2021; Phillips & Ferguson, 2013; Tiwari et al., 2020) and beneficial effects of connection to nature on well-being (Artuta, 2021; Capaldi et al., 2014; Teerapong et al., 2021; Schutte & Malouff, 2018; Zelenski & Nisbet, 2014). To the author's knowledge, the current study is the first study that examine the relationship between connection to nature and self-compassion, indicating their positive association. Therefore, this study takes a novel step towards understanding the positive impacts of connection to nature on self-compassion and adding to the scientific literature by understanding the relationship among self-compassion, connection to nature, and well-being. Most importantly, not only did this study examine the relationship between the overall score of self-compassion and connection to nature, but connection to nature was also associated with all three components of self-compassion.

The results from this study should be interpreted with cautions due to several limitations. First, because this study is cross-sectional, the results only indicate the correlation between connection to nature and self-compassion, as well as their positive association with well-being. However, a correlation does not infer connection to nature causes self-compassion, nor does it infer connection to nature and self-compassion independently causes well-being. It is possible that self-compassion causes higher connection to nature, and well-being causes higher emotional awareness and higher self-compassion. Experimental research is needed to prove causation. In

addition, because this study is conducted in the United States with a dominant percentage of sample who identified as European-American (72%), the findings of the study cannot fully represent people who belong to other racial-ethnic identities as well as people from other cultures.

There are a number of interesting future research directions to explore to further build upon this study. First, since this study use only self-report measures, future research may conduct experiment with manipulation designed to change people's connection to nature and examine its impact on self-compassion. Future research may also use the Ecological Momentary Assessment along with the State Self-Compassion Scale (S-SCS; Neff et al. 2021b) to further investigate the relationship between people's connection to nature and their levels of self-compassion in the present moment. The S-SCS was developed by Neff et al. (2021b) that effectively measures compassionate self-responding at one present moment. Second, future research may conduct moderation analysis that to how the association between connection to nature and self-compassion varies across different population. It is possible that factors such as people's physical location or places they have spent the most of their life make a difference, especially if there is a distinction between people's access to the nature. Finally, future research should replicate this study with more diverse samples and in other cultures. For example, according to Neff et al. (2008) cross-cultural study that included participants from Thailand, the United States, and Taiwan, although different cultures emphasize self-compassion differently, self-compassion has universal benefits for psychological well-being.

This study has important implications and applications. To this date, the majority of past interventions aiming to increase self-compassion have utilized strategies to increase mindfulness or specific kinds of therapy. For example, two influential self-compassion interventions in the

field are mindful self-compassion (MSC; Germer & Neff 2019) and Compassion-Focused

Therapy (CFT; Gilbert 2010). MSC is an eight-week program that enhances people's

mindfulness skills as foundation for self-compassion, including practices that can be used in

daily life. This study sheds light on designing alternative interventions that develop self-

compassion and thereby enhances well-being by targeting ways to increase people's connection

to nature. Especially since connection to nature is most strongly associated with common

humanity component of self-compassion, the intervention can direct people to be more aware of

how human is a part of a greater natural system and have shared experience in the natural world.

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