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TITLE

Unraveling the relationship between well-being, sustainable consumption and nature relatedness: a study of university students

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ABSTRACT

Many empirical studies have found an association between sustainable consumption and well-being. However, the direction of causality between these constructs remains unclear. Well-being could be an antecedent of sustainable consumption or, sustainable consumption a driver of well-being; also, there could be a reciprocal relationship between these two constructs. Alternatively, both well-being and sustainable consumption could be outcomes of another construct that could be masking a relationship between well-being and sustainable consumption. This study aims to advance the well-being and sustainable consumption research by testing these three relationships in a longitudinal study with young consumers (n =369). The findings show that when controlling for the constructs at Time 1, the relationship between the focal constructs is no longer significant. Results lead

to support the hypothesis that sustainable consumption and well-being are explained by a particular trait of the individual, nature relatedness, so that individuals with greater nature relatedness are more likely to adopt a sustainable lifestyle and have greater well-being. Nature relatedness thus acts as a predictor of both focal constructs. This result implies that by nurturing nature relatedness, societies will achieve the double dividend of well-being and sustainability.

KEYWORDS

Well-being, happiness, sustainable consumption, nature relatedness, longitudinal study

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UNRAVELING THE RELATIONSHIP BETWEEN WELL-BEING, SUSTAINABLE CONSUMPTION AND NATURE RELATEDNESS: A STUDY OF UNIVERSITY STUDENTS

Abstract

Many empirical studies have found an association between sustainable consumption and well-being. However, the direction of causality between these constructs remains unclear. Well-being could be an antecedent of sustainable consumption or, sustainable consumption a driver of well-being; also, there could be a reciprocal relationship between these two constructs. Alternatively, both well-being and sustainable consumption could be outcomes of another construct that could be masking a relationship between well-being and sustainable consumption. This study aims to advance the well-being and sustainable consumption research by testing these three relationships in a longitudinal study with young consumers (n =369). The findings show that when controlling for the constructs at Time 1, the relationship between the focal constructs is no longer significant. Results lead to support the hypothesis that sustainable consumption and well-being are explained by a particular trait of the individual, nature relatedness, so that individuals with greater nature relatedness are more likely to adopt a sustainable lifestyle and have greater well-being. Nature relatedness thus acts as a predictor of both focal constructs. This result implies that by nurturing nature relatedness, societies will achieve the double dividend of well-being and sustainability.

Keywords: well-being, happiness, sustainable consumption, nature relatedness, longitudinal study

1. Introduction

Scholarship has long studied the relationship between well-being (WB hereafter) and sustainable consumption (SC hereafter) or related constructs such as pro-environmental or conservation behavior.

Before explaining the rationale for the study, it is necessary to define the focal constructs of this research. In a broad sense, SC is defined as a lifestyle whereby consumers "meet their own consumption needs whilst also taking the environmental impacts of their actions into account" (Hobson 2002: 96). In particular, SC is defined in this study as a multi-faceted construct (Quazi et al. 2016; Vitell and Muncy 2005), comprising voluntary simplifying behaviors, purchase related behaviors (i.e., choice of sustainable goods and rejection of non-sustainable ones), and activism (Papaoikonomou et al. 2011). WB is a more controversial construct as different definitions have been proposed (Dodge et al. 2012; see a review of approaches and measures

in Huta 2017). In this study, we follow the much-used definition of Psychological Well-Being proposed by Ryff (1989): he conceptualized WB as a multidimensional construct comprising six dimensions that enable human development and positive psychological functioning (Ryff and Keys 1995: 720): self-acceptance, personal growth, purpose in life, positive relations with others, environmental mastery and autonomy.

A positive association between WB and SC constructs has been replicated in different cultural settings (Kasser 2017), with different measures of SC - such as voluntary simplicity (Rich et al. 2017), energy or water conservation behavior (Kaida and Kaida 2016) or sustainable purchasing (Hwang and Kim 2018) - and with different measures of WB- emotional (Venhoeven et al. 2013), social (Prati et al. 2017), or eudaimonic WB (Rich et al. 2017)-.

However, the causal direction between SC and WB is unclear. Results from past studies suggest that there are three possible relationships between these constructs (Kasser 2017). First, it could be that only one of these constructs is an antecedent of the other; second, there could be a reciprocal relationship between SC and WB or third, the association between WB and SC could be explained by the presence of a third variable that produces both outcomes. However, given that past research has examined one of these relationships at a time, it is difficult to establish which of the possible explanations is more valid. This study aims to fill this gap by making a twofold contribution to the literature.

First, using an incremental model strategy and a longitudinal study design, this study examines the three possible relationships in the same data set. Most studies have been based on cross-sectional and correlational data. This methodological choice limits the conclusions about the causal direction (Kasser 2017) and poses the methodological problem of endogeneity (Wang and Kang 2019). Cross-sectional data are appropriate "to begin the testing of causal hypotheses" (Rutter 1994: 928), since cross-sectional data meet two of the markers of causality (covariation between constructs and coherence between observed covariation and the theorized causal mechanism) (Rindfleisch et al. 2008). However, as the research agenda proceeds, longitudinal data could be used to enhance causal inference, as this data allow controlling the temporal condition (Rindfleisch et al. 2008). As the constructs under examination are assumed to be stable - future WB(SC) is expected to be highly determined by past WB(SC)- a longitudinal design is especially recommended as it allows controlling for such effect (Robinson and Demaree 2007). Additionally, longitudinal data are viewed as superior to cross-sectional data in terms of reducing the risk of alternative explanations (Hsiao 2005), especially when focusing on how outcomes are influenced by changes in a predictor within a set of entities.

Second, this replication with extension study contributes to past literature by clarifying the causal relationship between WB and SC and by demonstrating the role of nature relatedness (NR hereafter) as an antecedent of both SC and WB.

The present study is focused on young adults, a critical stakeholder group in the transition towards sustainability (Ojala 2012). Although this segment of society is increasingly concerned about sustainable issues (IA 2019), it has been also shown to act less sustainably compared to previous cohorts (Binder et al. 2020), partly as a consequence of their materialistic and hedonistic attitudes (Kuoppamäki et al. 2017). By testing the influence of NR as a construct that could explain both SC and WB, this study will provide opportunities to escalate SC and young adults' WB; although NR is considered a stable trait (Capaldi et al. 2014), there are specific practices that can be implemented in educational settings that have been proved to enhance connection with nature (Bragg 1996; Olivos and Clayton 2017).

2. Literature Review

As Kasser (2017) defended, there could be three possible relationships between SC and WB. First, it could be that only one of these constructs is antecedent of the other; second, there could be a reciprocal relationship between SC and WB or third, the association between WB and SC could be explained by the presence of a third variable that produces both outcomes. Past studies have examined each of these possibilities separately which, as we explained above, does not allow determining which of these explanations proves more valid. Next, the approaches to the study of the relationship between SC and WB are explained.

First, some studies have defended and tested that SC is an antecedent of WB (Choi 2016; Corral-Verdugo et al. 2011; Hwang and Kim 2018; Kaida and Kaida 2016; Rich et al. 2017; Schmitt et al. 2018; Suárez-Varela et al., 2016; Venhoeven et al. 2016; Welsch and Kühling 2011; Xiao and Li 2011). It is widely accepted that SC would nurture eudaimonic or psychological WB (Carrero et al. 2020; Venhoeven et al. 2016), as it is deemed an inherently worthwhile, meaningful and transcending activity that is expressive of one's deep values (Waterman 1993). Also, the pursuit of intrinsic goals, such as SC, has been found to increase WB (Manolis and Roberts 2011; Suárez-Varela et al. 2016). Others have defended that SC increases WB because it provides satisfaction for the three innate needs of autonomy, relatedness and competence (Rich et al., 2017). Thus, it is plausible to expect that adoption of SC increases WB. In

particular, studies of young consumers have found a positive association between SC and WB (Choi 2016; Corral-Verdugo et al. 2011; Prati et al. 2016; Tiwari, 2016).

A second, albeit smaller, set of studies have examined the reverse the relationship, namely that WB antecedes SC (Brown and Kasser 2005; Ganglmair-Wooliscroft and Wooliscroft 2016). This finding has been also found among young consumers: the more eudaimonic well-being a young consumer has, the more likely is to engage in SC (Manríquez-Betanzos et al. 2016). This approach defends that those engaged in eudaimonic living experience greater life satisfaction and this enhanced life satisfaction deters them from overconsumption (Brown and Kasser 2005; Kasser 2009, 2017). SC would be thus a consequence of their eudaimonic living or the pursuit of self-growth, self-expression and meaning in life (for a description of eudaimonic living see Lewis et al. 2014).

Taking together, these arguments would also support a reciprocal relationship between SC and WB constructs (Lyubomirsky et al. 2005; Tkach and Lyubomirsky 2006), although there is scarce evidence in support of this possibility. To our knowledge, only a study examined this possibility and found a reciprocal relationship between social WB and SC (Prati et al., 2017).

A third set of studies have contended that both WB and SC are produced by another variable. SC and WB are considered to be the effects of some underlying character that explains why the individual is more prone to adopt a sustainable lifestyle and more likely to have greater WB (Kasser 2017). Or in other words, there is not a direct relationship between SC and WB; rather, this underlying individual identity produces both SC and WB. To identify the traits forming this identity, Kasser (2017) reviewed several constructs that had been found antecedents of both SC and WB. He proposed that mindfulness-as-a-trait and intrinsic values could be two of the variables that reflect this underlying identity. Indeed, a previous study by the author showed that mindfulness-as-a-trait and intrinsic values were antecedents of SC and WB (Brown and Kasser 2005). However, their cross-sectional study was unable test a causal relationship between SC and WB, so their study did not allow ruling out whether there is a direct relationship between SC and WB. Other authors (Binder and Blankenberg 2017) have found that environmental self-image explain the relationship between WB and pro-environmental behavior, a similar notion to SC, which provides additional support for this third explanation. In particular, studying young consumers, Binder et al. (2020) found that the type of orientation in life (inner or outer oriented) conditions the relationship between life satisfaction and pro-environmental behavior.

Following the same procedure employed by Kasser, we propose that interdependence with nature is an adequate trait that could explain both adoption of SC and greater WB. The positive psychological influence that interdependence with nature has on individuals has been long defended by several authors (Bragg 1996; Kellert 1993; Kellert and Wilson 1993) and evidence has consistently shown the positive association between interdependence with nature and WB (Capaldi et al. 2014; Cleary et al. 2019; Nisbet et al. 2011; Pritchard et al. 2020; Zelenski and Nisbet 2014). Simultaneously, the more an individual integrates nature into her self-construal, the more likely is to carry out actions to protect nature or to avoid harm to nature, because harming nature would be akin to harming herself (Bragg 1996). Not surprisingly, past reviews suggest that interdependence with nature is highly and directly correlated with SC (Davis et al. 2009; Dutcher et al. 2007; Gifford and Nilsson 2012; Kals et al. 1999; Mayer and Frantz 2004; Nisbet et al. 2009; Tam 2013; Trudel 2019; Zelenski et al. 2015; White et al. 2019). Moreover, the trait of interdependence with nature has been found to correlate with intrinsic aspirations (Weinstein et al. 2009) and with mindfulness-as-a-trait (Barbaro and Pickett 2016; Howell et al. 2011). This evidence suggests that these traits could be markers of an underlying identity that can explain both adoption of SC and WB, as Kasser contended (2017).

In particular, this study uses the construct of nature relatedness (NR, Nisbet et al., 2009). NR is one of the many constructs that form the nomological network of human interdependence with nature (Capaldi et al. 2014), such as commitment to nature (Davis et al. 2009), environmental identity (Clayton 2003) connectedness with nature (Mayer and Frantz 2004), inclusion of nature in the self (Schultz 2002), connectivity to nature (Dutcher et al 2007), emotional affinity towards nature (Kals et al. 1999), or ecological identity (Walton and Jones 2018).

NR "encompasses one's appreciation for and understanding of our interconnectedness with all other living things on the earth" (Nisbet et al. 2009: 718). It is conceptualized as a multidimensional construct encompassing three dimensions (Nisbet et al. 2009). The self dimension represents the "internalized identification with nature, reflecting feelings and thoughts about one's personal connection to nature" (Nisbet et al. 2009: 723); the perspective dimension reflects "an external, nature-related worldview, a sense of agency concerning individual human actions and their impact on all living things" (723); and the experience dimension represents "the physical familiarity with the natural world, the level of comfort with and desire to be out in nature" (725).

The multidimensionality of NR justifies the superior explicative and predictive power of NR over other similar constructs (Tam 2013; Tang et al. 2015), that only capture the affective dimension (e.g. the construct "emotional affinity towards nature") or the identity dimension (e.g., "inclusion of nature in the self"). Additionally, its reliability and validity have been amply confirmed in different cultural settings (Capaldi et al. 2014; Howell et al. 2011; Olivos and Clayton 2017). Indeed, a comparative study of these constructs found that nature relatedness higher correlated with external validity criterion variables such as WB and environmental behavior than other constructs (Tam 2013).

In particular, there is much evidence that nature relatedness increases WB (e.g., Capaldi et al. 2014; Cleary et al. 2019; Nisbet et al. 2011; Zelenski and Nisbet 2014): those experiencing a subjective connection with nature are more likely to report positive affect, vitality and life satisfaction. Also, empirical studies have consistently found that NR is a predictor of SC and of pro-environmental behavior (Davis et al. 2009; Dutcher et al. 2007; Kals et al. 1999; Mayer and Frantz 2004; Nisbet et al. 2009; Tam 2013; Zelenski et al. 2015). Based on these arguments, it is plausible to defend that that both WB and SC are outcomes of NR; controlling by NR, the relationship between WB and SC should no longer be significant.

3. Method

3.1. Objective and model strategy

This study examines these four different explanations in the same data set, using an incremental model strategy (Fig. 1). This strategy consists of designing, testing and comparing a model incrementally, that is, adding new relationships each time in order to gather a better explanation of phenomena (Pedrycz and Kwak 2007).

Fig. 1 Conceptual models

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3.2. Data collection

Data were collected from a sample of first-year students from a Spanish University. The use of a student sample is appropriate for the purpose of this study, interested in the existent relationship among WB, SC and NR rather than in the level of these variables. Student samples are recommended when seeking for homogeneity (Ashraf and Merunka 2017); indeed, the university setting provides a uniform environment (Henry 2008) that minimizes the effect of situational and personal barriers that can affect particularly the relationship between WB and SC (Bray et al. 2011). Past studies on the relationship between WB and SC

have frequently used students samples (e.g. Choi 2016; Corral-Verdugo et al. 2011; Manríquez-Betanzos et al. 2016; Tiwari 2016), especially in longitudinal designs (Prati et al. 2017).

Data were collected at two points in time. At time 1, to avoid self-selection and ensure a greater completion rate, the students were recruited in their classrooms during classes although participation was voluntary and could be ceased at any point in time during the study. The teacher was not present during data collection. Permission for data collection was given by the deans and the study was approved by the Committee of Ethics. All data were treated confidentially, which was communicated to the respondents at the beginning of the session. In order to link responses at time 1 (T1) and time 2 (T2) without violating such confidentiality, respondents were asked to provide a password. A total of 906 individuals responded to the call for participation and provided data at T1. Time taken for completing the questionnaire was controlled and those questionnaires that were answered in less than 6 minutes were removed (45 individuals) as a control for common method effects, yielding a final usable sample at T1 of 861 individuals.

Six months later the same students were contacted in the same setting and were invited to voluntarily participate in the follow-up. Confidential treatment of their responses was again guaranteed. Some students refused to answer the follow-up questionnaire, others did not remember their password, while other responses were removed considering the short period of time used for answering the questions. With these exclusions, 369 valid responses in T2 were finally obtained (57% of droppers). The valid sample of respondents having completed questionnaires at T1 and T2 was of 369 students.

To check attrition bias, it was examined whether drop-outs at T2 (n = 492) and non-drop-outs (n = 369) reported significant differences in variables such as SC, NR, WB or gender. No differences were found in SC (M_{dropp}=2.967, SD_{dropp}=.644; M_{remain}=2.956, SD_{remain}=.613; p=.799), NR (M_{dropp}=3.106, SD_{dropp}=.916; M_{remain}=3.027, SD_{remain}=.904; p =.211), WB (M_{dropp}=3.824, SD_{dropp}=.441; M_{remain}=3.809, SD_{remain}=.467; p =.752) or percentage of females (M_{dropp}=.472, SD_{dropp}=.500; M_{remain}=.518, SD_{remain}=.500; p =.099).

3.3. Measures

Sustainable Consumption. SC was measured with a 10-item, 5-point Likert scale based on Webb et al. 's (2008) scale adapted to the particularities of Spain, where SC is far from being institutionalized in comparison to other European countries (Valor et al. 2020). Whereas some studies have measured a single dimension of SC, such as energy conservation behavior (Prati et al. 2017) or water conservation behavior (Manríquez-Betanzos et al. 2016), the use of a multifaceted scale comprising different types of behaviors in different domains (Quazi et al. 2016; Vitell and Muncy 2005) increases the content validity.

Consequently, items measuring smart-shopping, activism or downshifting were included (e.g. "*I try to make a determined effort to consume less*" or "*I participate in campaigns of activism, sending emails, signing requests*").

Well-being. The psychological well-being 29 item scale (Ryff and Keyes 1995) was used as the measure of WB. This well validated measure includes six markers of WB: three markers related to self-fulfillment (self-acceptance, personal growth, and purpose in life), two related to perceived behavioral control (environmental mastery and autonomy) and finally one marker of social WB (positive relations). All items were measured in a five-point Likert scale (Ryff 1989; Ryff and Singer 2008). In particular, the Spanish translation of the psychological well-being scale (Díaz et al. 2006) was used, as the psychometric properties of this scale have already been tested and are acceptable. Each marker was computed as the mean of its corresponding items. WB was introduced in the models as a first-order construct, that is, a single construct explained by six items, each item being the average obtained for each of the markers.

Nature relatedness. NR was measured at T1 using the 6-item version of the Nature-Relatedness Scale developed by Nisbet and Zelenski (2013) to describe individual levels of connectedness with the natural world. Sample items included "*My connection to nature and the environment is a part of my spirituality.* " or "*My relationship to nature is an important part of who I am*". Originally measured with a 21-item scale, Nisbet and Zelenski (2013) developed a briefer 6-item scale reflecting two of the three original dimensions (self and experience), as the validity correlations were stronger without the pro-conservation items. Notwithstanding, the brief scale is highly correlated with the original scale (r =.91). It has more than acceptable reliability and predictive values while reducing the original number of items by about two-thirds, which avoids the informant's fatigue. Indeed, the predictive ability of this short NR scale has been demonstrated across multiple samples and with longitudinal data (Nisbet and Zelenski 2013).

Confirmatory Factor Analyses (CFA) were conducted to assess the adequacy of the scales. Reliability was good for all the constructs (α >.7) (see Table 1, for detailed results). The validity of the scales was also awarded based on statistically significant and mostly over .35 standardized regression weights (SRW) and good fit measures. For the fit indices IFI, TLI, and CFI values over .9 indicate good fit and over .95 excellent fit; for the fit index RMSEA values under .08 indicate good fit and under .05 very good fit (Hair et al. 2006).

<<insert Table 1 over here>>

3.4. Analyses

The use of longitudinal data usually reduces the possibility of common method bias (Rindfleisch, et al. 2008). Nonetheless, a Harman's one factor test (an un-rotated factor analysis on all items used in the model) was conducted to ensure this is the case (Williams et al. 2017). This analysis showed that explained variance by the first factor was less than half of total variance (27.38% at T1 and 27.92% at T2); thus, common method bias is unlikely to be a risk.

To test and estimate the conceptual models, data were analyzed with structural equation modeling (SEM) using AMOS version 20 (Israelashvili and Karniol 2018). This methodology is particularly appropriate when testing alternative models (Israelashvili and Karniol 2018) as it overcomes the limitation of traditional regression analyses, allowing to have several outcomes in the same model, as is the case. Cross-lagged longitudinal analyses were used in which SC and WB at T2 were controlled by the corresponding constructs at T1. Thus, the following parameters were included in the model: covariance among the constructs at the same time point; covariance between error terms of each indicator at T1 and the corresponding indicator at T2; constructs at T1 to control for baseline levels for each variable; and cross-lagged relationships to test the hypotheses (Cole and Maxwell 2003; Prati et al. 2017). Different models were tested using an incremental strategy. Model 1a tested the relationship between SC and WB, being WB the dependent variable; Model 1b tested the inverse relationship. In Model 2, an additional relationship was added so that the reciprocal relationship between SC and WB was examined. Finally, in Model 3, two more relationships were added to the previous model: the influence of NR on both SC and WB.

In order to evaluate which of the models fitted data best and thus, to examine which of the four models empirically proves more valid, those models were compared by means of chi-square tests. Accordingly, the best fitting model, measured by a significant $\Delta\chi^2$, will be accepted (Israelashvili and Karniol 2018).

4. Results

Descriptive statistics of constructs in the models are shown in Table 2. As expected, a strong and positive correlation of WB and SC was observed both in T1 and T2 (Robinson and Demaree 2007). These correlations indicate that future WB(SC) is affected by past WB(SC), thus, confirming the adequacy of using longitudinal data to control for this effect. As expected, correlations between the three focal constructs were statistically significant and positive at T1 and T2, albeit of medium size. Particularly, the correlation between SC and WB at T1 was slightly stronger than the corresponding one at T2. This is explained by a non-significant variation in the level of SC and WB from T1 to T2 (p =.818 and p =.116 respectively). As

differences were not statistically significant, we believe this fact does not have any implication for the general conclusion of the analysis.

<<insert Table 2 over here>>

Each model (Fig. 1) was tested separately. Standardized direct estimates of the models are shown in Table 3. In model 1a, no significant relationship between SC at T1 and WB at T2 was found when controlling for both variables at T1. As Table 3 shows, the relationship between SC at T1 and SC at T2 was significant (p <.001) and also the relationship between WB at T1 and WB at T2 (p <.001). However, the relationship between SC (T1) and WB (T2) was not significant (p =.848), when the effect of the construct at T1 is controlled for. Similar results were obtained for Model 1b: when controlling for SC (T1) and WB (T1), the relationship between WB at T1 and SC at T2 was no longer significant (p =.249). Thus, even when Pearson correlation shows a significant and positive correlation between WB and SC at different time points, when the effect of the past measure is controlled for, the relationship between them is no longer significant.

<<insert Table 3 over here>>

Similar results were obtained in model 2, built as an incremented model 1 through the introduction of the two previous relationships together. Although correlations between SC and WB at different time points are significant, once constructs at T2 are controlled by the corresponding constructs at T1, the focal relationships (SC(T1) → WB(T2) and WB(T1) → SC(T2)) are no longer significant.

Finally, model 2 was incremented by adding the relationships accounting for SC and WB as outcomes of NR (NR(T1) → WB(T2) and NR(T1) → SC(T2)) to get model 3. In model 3 the "controlling relationships" were found significant but the paths linking SC and WB at different time points were again found non-significant. However, more importantly, the two paths from NR to SC and WB were found significant. These results support the fact that SC and WB can be considered outputs of a third variable, NR, that is explaining the covariation between SC and WB. An increase in NR is linked to an increase of both SC and WB that, therefore, correlate in a positive and significant way. Thus, differently to previous cases, the relationships between NR(T1) and SC(T2) and WB(T2) are statistically significant and positive even when variables at T2 are controlled by corresponding at T1.

Having tested the four models, they were compared to elucidate which of them proves more valid, what is usually done by comparing fit measures and, specifically, by using χ^2 difference tests (Israelashvili and Karniol 2018). Measures in Table 4 indicate all the models yielded a good fit to the data. In fact, although all the models presented similar fit, model 3 was best in all the measures (smallest value for $\chi 2$, $\chi 2$/df and biggest values for IFI, TLI and CFI). In order to test whether or not differences were statistically significant,

χ^2 differences were computed. Model 1a and model 1b did not show a significant deterioration in model fit compared to model 2 ($\Delta\chi^2$=1.310, Δdf=1, p =.252; $\Delta\chi^2$=.038, Δdf=1, p =.845; respectively). This is unsurprising, since none of the incremental relationships were significant in model 2. However, model 3 presented significant better fit than model 1a, model 1b and model 2 ($\Delta\chi^2$=11.645; Δdf =3, p.<.001; $\Delta\chi^2$=10.373; Δdf =3, p <.001; $\Delta\chi^2$=2.071; Δdf =2, p =.006; respectively) awarding the significant better fit for model 3. This result was expected as well since model 3 increments model 2 with two statistically significant relationships (NR(T1) → WB(T2) and NR(T1) → SC(T2)). Hence, the results of the current tests indicate that model 3 represents a better approximation to the data, significantly above and beyond the alternative models. Accordingly, this comparison among models also supports the third explanation as they show the superior fit of the model where SC and WB are included as outcomes of variable NR.

<<insert Table 4 over here>>

5. Discussion

Following Kasser's (2017) and past work on SC and WB, the present study has tested four hypotheses to explain the causality direction between wellbeing and SC in a sample of young consumers. Correlational studies had concluded that SC and WB had a significant relationship although the direction of this relationship was unclear. In addition, there were claims for further research in this field to unveil whether this relationship could be, indeed, an "statistical artifact" (Binder and Blankenberg 2017).

The use of longitudinal data and the strategy of testing incremental models have led to show that, although SC and WB covariate, when past measures of these constructs are controlled for, there is not a significant relationship between these constructs. Rather, the covariance between SC and WB is better explained by a third variable: nature relatedness. Individuals with an interdependent self-construal are more likely to practice SC and have greater levels of WB. The influence of this variable is differential, since the relationship between NR and both outcomes is still significant when controlling by baseline levels.

This study shows the role of NR as a variable that can explain the covariance between SC and WB, adding this trait to other already found constructs that may be considered as indicators of a particular identity that makes the individual more likely to adopt SC and to experience greater WB. In particular, as Kasser (2017) discusses, mindfulness-as-a-trait and intrinsic values may also cause both SC and WB. In view of other studies, it is plausible to defend that these constructs are related with NR and thus be reflections of that particular identity. First, NR is theoretically linked to the notion of ecological self (Naess 1973) and reflects

how people identify with the natural environment and connect to other life in the planet (Nisbet et al. 2011). People oriented toward personal growth, relationships, and community (Kasser and Ryan 1996) would be expected to have higher connectedness with nature and prioritize the planet ahead of materialistic values (Nisbet 2005; Schultz 2002). Second, past studies have shown the significant and reciprocal association between mindfulness and NR (Schutte and Malouff 2018); since dispositional mindfulness is associated with greater interdependence, it may also nurture greater NR (Hanley et al. 2017).

In sum, findings of this study support the third explanation for the relationship between SC and WB as it reinforces the idea that some underlying character explains why the individual is inclined to adopt SC and have greater WB. Future studies should examine what other traits may constitute this character. A working procedure to identify other traits that could explain both SC and WB would consist of comparing reviews or meta-analysis of antecedents of SC and WB and identify common traits that can predict both outcomes. For instance, the personality traits of Agreeableness and Openness to Experience (Gifford and Nisson 2012; Kokko et al. 2013) have been found to correlate with SC. Similarly, meta-analyses also concluded that Agreeableness was a predictor of well-being (DeNeve and Cooper 1998; Soto 2015). It is plausible to assume that this trait could be considered part of the underlying identity that is the antecedent of both SC and WB. Future studies could test whether it explains both SC and WB.

Despite using longitudinal data and a similar sample, our data do not replicate the reciprocal relationship found by Prati et al. (2017) between pro-environmental behavior and social WB on a sample of students. The reason for the different results could lie in the measures used: the present study has utilized more comprehensives measures of SC and WB, whereas that study examined only conservation behavior and the social dimension of WB. As other studies have shown, SC impacts differently the distinct dimensions of WB (Carrero et al. 2020; Venhoeven et al. 2013) affecting positively some dimensions and negatively others. Likewise, other studies have found that some sustainable behaviors accrue WB and others reduce it (Schmitt et al. 2018). Since our study used more comprehensive measures of both WB and SC, the positive and negative influences between SC and WB could have been captured and cancelled out. This could explain why the relationship between the focal constructs is not found significant.

Findings of this study have practical implications. As this study has shown the centrality of NR in producing both SC and WB, we suggest that nurturing stronger environmental identities among individuals would allow achieving a double dividend (Jackson 2005): to ameliorate environmental problems and to enhance young adults' WB. Our results highlight the importance of environmental education programs as NR is

malleable and can be nurtured (Nisbet et al. 2009). Different strategies have been implemented in educational settings allowing us to determine which practices are the most effective. Such programs can combine knowledge of environmental problems with experiences in nature (Liefländer et al. 2013) but the experiential part is key (Lumber et al. 2017). For instance, exposing students to outdoor activities (i.e. science experiments in forests, discovery games) can facilitate their connection with nature (Liefländer et al. 2013). Also, the presence of active role models (e.g. parents, educators) predispose children and young adults to value and show interest in nature (Chawla and Cushing 2007). Finally, past studies show that such programs should be incorporated at early stages and be implemented with a long-term or repeated experience (Ernst and Thaimer 2011; Schultz and Tabanico 2007). Apart from educational programs, other interventions can be used to enhance NR. For instance, meditation practices have been shown to facilitate nature connection especially when such experiences are implemented in nature (Unsworth et al. 2016).

This study has implications for future researchers examining this issue. The present study shows the methodological weakness of correlational studies to unveil the causal relationship between SC and WB. Also, findings suggest that NR should be included as a control in future models.

Notwithstanding, this study has some the limitations. Despite the advantages of using longitudinal rather than cross-sectional designs, only two observations per individual were considered. Regarding the study design, the use of longitudinal data is inferior to experimental data (Rutter 1994). However, in this case experiments are not appropriate to test whether WB produces SC, since manipulation of WB is difficult if not impossible. The use of student samples also represents a limitation. Nonetheless, large differences in results should not be expected since meta-analyses show that age does not moderate the relationship between interdependence with nature and WB (Capaldi et al. 2014; Pritchard et al. 2020). Anyway, to test the robustness of our results and increase ecological validity further testing in other populations is necessary (Calder et al. 1981).

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Table 1. Measurement adequacy measures

	T1				T2			
	SRW	Alpha	Fit measures		SRW	Alpha	Fit measures	
WB.1 (Self- acceptance)	.745		Chi	20.919	.809		Chi	27.310
WB.2 (Personal growth)	.630		df	7	.715		df	7
WB.3 (Purpose in life)	.816	.79	IFI	.981	.819	.81	IFI	.974
WB.4 (Environmental mastery)	.803		TLI	.958	.715		TLI	.944
WB.5 (Autonomy)	.332		CFI	.980	.404		CFI	.974
WB.6 (Positive relations)	.343		RMSEA	.074	.423		RMSEA	.089
SC.1	.622				.695			
SC.2	.134				.208			
SC.3	.750		Chi	80.972	.817		Chi	100.056
SC.4	.175		df	32	.29		df	32
SC.5	.439	.75	IFI	.954	.443	.82	IFI	.951
SC.6	.446		TLI	.935	.518		TLI	.930
SC.7	.886		CFI	.954	.894		CFI	.950
SC.8	.806		RMSEA	.064	.863		RMSEA	.076
SC.9	.334				.385			
SC.10	.236				.456			
NR.1	.442		Chi	13.467				
NR.2	.624		df	7				
NR.3	.809	.85	IFI	.993				
NR.4	.578		TLI	.985				
NR.5	.913		CFI	.993				
NR.6	.805		RMSEA	.050				

df = degrees of freedom

Table 2. Descriptive statistics and correlations. Cronbach's alpha in brackets

			Correlations				
	Mean	Std. Dev.	WB(T1)	WB(T2)	SC(T1)	SC(T2)	NR(T1)
WB(T1)	3.809	.467	(.79)				
WB(T2)	3.754	.483	.702**	(.81)			
SC(T1)	2.956	.613	.217**	.150*	(.75)		
SC(T2)	2.967	.693	.189**	.134*	.608**	(.82)	
NR(T1)	3.027	.904	.206**	.239**	.593**	.445**	(.85)

*,** Statistically significant at .05 and .01, respectively

Table 3. Standardized estimates. P-values in brackets

			Model 1a (SC →WB)	Model 1b (WB→ SC)	Model 2 (SC ↔WB)	Model 3 (SC← NR→WB)
SC(T1)	→	SC(T2)	.621 (.000)	.606 (.000)	.606 (.000)	.524 (.000)
WB(T1)	→	WB(T2)	.701 (.000)	.703 (.000)	.701 (.000)	.690 (.000)
SC(T1)	→	WB(T2)	.009 (.848)		.009 (.845)	-.088 (.136)
WB(T1)	→	SC(T2)		.058 (.249)	.058 (.249)	.049 (.326)
NR(T1)	→	SC(T2)				.124 (.055)
NR(T1)	→	WB(T2)				.149 (.013)

Table 4. Goodness of fit measures

Models	Chi	df	Chi/df	IFI	TLI	CFI	RMSEA
M1a	1312.247	631	2.080	.901	.888	.899	.054
M1b	1310.975	631	2.078	.901	.888	.900	.054
M2	1310.937	630	2.081	.901	.888	.899	.054
M3	1300.602	628	2.071	.902	.889	.901	.054