

## Personality and environmental concern

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### ABSTRACT

People vary considerably in their attitudes toward environmental issues. Although some individuals view the environment from a purely utilitarian perspective, others are concerned about environmental sustainability and maintaining an ecological balance. The current study examines the relationship between personality characteristics and environmental concern in a community sample of 2690 German adults. Structural equation modeling revealed that greater environmental concern was related to higher levels of Agreeableness and Openness, with smaller positive relationships emerging with Neuroticism and Conscientiousness.

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### 1. Introduction

For better or for worse, human behavior has a large influence on the global ecology. Many of the environmental challenges facing us today are a direct result of human actions, and as such may require behavioral solutions (Oskamp, 2000; Saunders, 2003). In recognition of this fact, many researchers have investigated the social and psychological factors that influence environmental attitudes and behaviors. Much of this research has focused on the role of specific values, beliefs, and norms as predictors of environmental concern (Dietz, Fitzgerald, & Shwom, 2005; Dietz, Stern, & Guagnano, 1998; Schultz, 2001; Van Liere & Dunlap, 1980).

More recently, environmentalism has been examined from the perspective of the “Big Five” taxonomy of personality traits, which describes variation in human personality across the five broad dimensions of Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience (Goldberg, 1993). These broad trait dimensions can be used to predict more specific attitudes and value orientations (McCrae & Costa, 2008; Roccas, Sagiv, Schwartz, & Knafo, 2002). Two of these traits, Agreeableness and Openness, have emerged as significant predictors of pro-environmental values (Hirsh & Dolderman, 2007). These findings are consistent with theoretical models that relate pro-environmental attitudes to higher levels of empathy and self-transcendence (Schultz, 2000; Schultz & Zelezny, 1999), which appear to be related to Agreeableness and Openness, respectively. Individuals who are more empathic and less self-focused appear more likely to develop a personal connection with nature, which in turn

predicts their pro-environmental attitudes (Bragg, 1996; Mayer & Frantz, 2004). Indeed, developing such an emotional affinity toward the natural environment can bolster one’s motives for environmental protection (Kals, Schumacher, & Montada, 1999).

While both Agreeableness and Openness fit well into theoretical models of pro-environmental attitudes, the initial study demonstrating their predictive utility was limited to a relatively small sample of undergraduate students ( $N = 106$ ). The initial study was also limited by the imbalance of male ( $n = 32$ ) and female ( $n = 74$ ) participants, making it difficult to examine the importance of gender as a moderating variable. The current study extends this previous research by examining the personality predictors of environmental concern in a much larger community sample of German adults ( $N = 2690$ ). Additionally, structural equation modeling was used to provide error-reduced estimates of the true relationships between the variables of interest. It was hypothesized that both Agreeableness and Openness would remain significant predictors of increased environmental concern.

### 2. Methods

#### 2.1. Participants

Data analyses were based on the responses of 2690 participants of the German Socio-Economic Panel Study (GSOEP), a longitudinal research project that polls a large and diverse sample of German households (Haisken-DeNew & Frick, 2005). While the full GSOEP sample is considerably larger, the current analysis could only be conducted on the subset of respondents who completed the available measures of personality and environmental concern, described below. The age of participants in the current sample ranged from 26 to 93 years ( $M = 54.1$ ,  $SD = 14.6$ ). A reasonably

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balanced proportion of male (47%) and female (53%) respondents were included.

## 2.2. Materials

### 2.2.1. Personality

In 2005, GSOEP participants completed a 15-item version of the Big Five Inventory (BFI; Gerlitz & Schupp, 2005; John, Donahue, & Kentle, 1991), which measures the Big Five personality traits of Extraversion, Agreeableness, Conscientiousness, Neuroticism, and Openness to Experience. This shortened version of the BFI, known as the BFI-S, demonstrates good internal coherence and has been validated against longer inventories assessing the five major factors of personality. Each trait domain is represented by 3 descriptive phrases to which respondents must rate their agreement on a scale ranging from 1 (*Does not apply*) to 7 (*Does apply*). Sample phrases include “Worry a lot” and “Value artistic experiences”.

### 2.2.2. Environmental concern

Although there is no standard scale measuring environmental concern in the GSOEP dataset, there are a number of specific items that probe respondents’ environmental attitudes. In the current analysis, we used 3 items administered at multiple time points as indicators of a latent environmental concern factor. In particular, the items of interest were “Environmentally Conscious”, “Importance of Environmental Protection”, and “Worried about Environment”. Each of these items was administered on multiple occasions. To the extent that there is a stable dispositional component to environmental concern, it should be captured by the shared variance of these cross-time measures (cf. Kenny & Zautra, 1995).

The “Environmentally conscious” item was administered in 1998 and 2003; the “Importance of environment” item was administered in 1994, 1998, and 1999; finally, the “Worried about environment” item was based on data collected in 2005–2007. Examining the shared variance amongst these items allowed for an error-reduced estimate of environmental concern across a large time period.

## 2.3. Analytic technique

Structural equation modeling was used to explicitly model sources of error in the dataset, thereby providing more accurate estimates of the true relationships between the variables of interest. In particular, we employed a measurement model that accounts for acquiescence bias, halo bias, and the observed correlations among Big Five personality traits (Anusic, Schimmack, Pinkus, & Lockwood, 2009). First, each Big Five domain was modeled as a latent factor reflected in the 3 indicator items (e.g., “Value artistic experiences”). Second, a halo bias factor was modeled as the shared variance among each of these latent Big Five domains. Third, an acquiescence factor was modeled as the shared variance amongst each of the individual questionnaire items. Fourth, the higher-order Big Five factors (DeYoung, 2006; Digman, 1997; McCrae et al., 2008) were modeled as reflecting the shared variance among Agreeableness, Conscientiousness, and Neuroticism (Stability or Alpha), and Extraversion and Openness (Plasticity or Beta). In order to ensure the model would be identified, the regression weights were fixed to be equal for the loadings within each of the halo, acquiescence, and higher-order personality factors. Note, however, that while such equality constraints force the unstandardized coefficients to be equal, the standardized coefficients (as will be reported below) also depend upon the variance of the indicators and may thus differ from one another.

Environmental concern was modeled in a two-step hierarchical process. First, three latent variables were constructed, one for each

set of the environmental items described above. For example, the three separate assessments of “Importance of environmental protection” were used as indicators of a latent factor. Second, an overall environmental concern factor was modeled as the shared variance amongst each of the three item-based environmental factors. Regression lines predicting this overall environmental concern variable were drawn from each of the latent Big Five trait factors. The resulting model allowed for an error-reduced examination of the contributions of the Big Five personality traits to environmental concern over time.

## 3. Results

### 3.1. Model fit

Reasonable fit is provided by a model when CFI > .90, RMSEA < .08, and SRMR < .10 (Kline, 2005). The current model demonstrated acceptable to good fit, with a CFI of .91, RMSEA of .045 (90% confidence interval of .043–.047), and SRMR of .05. The chi-square value of 1406.46 ( $df = 218$ ) was significant at  $p < .001$ ; however, because the current sample is relatively large, the chi-square test is not an optimal indicator of fit.

### 3.2. Personality and environmental concern

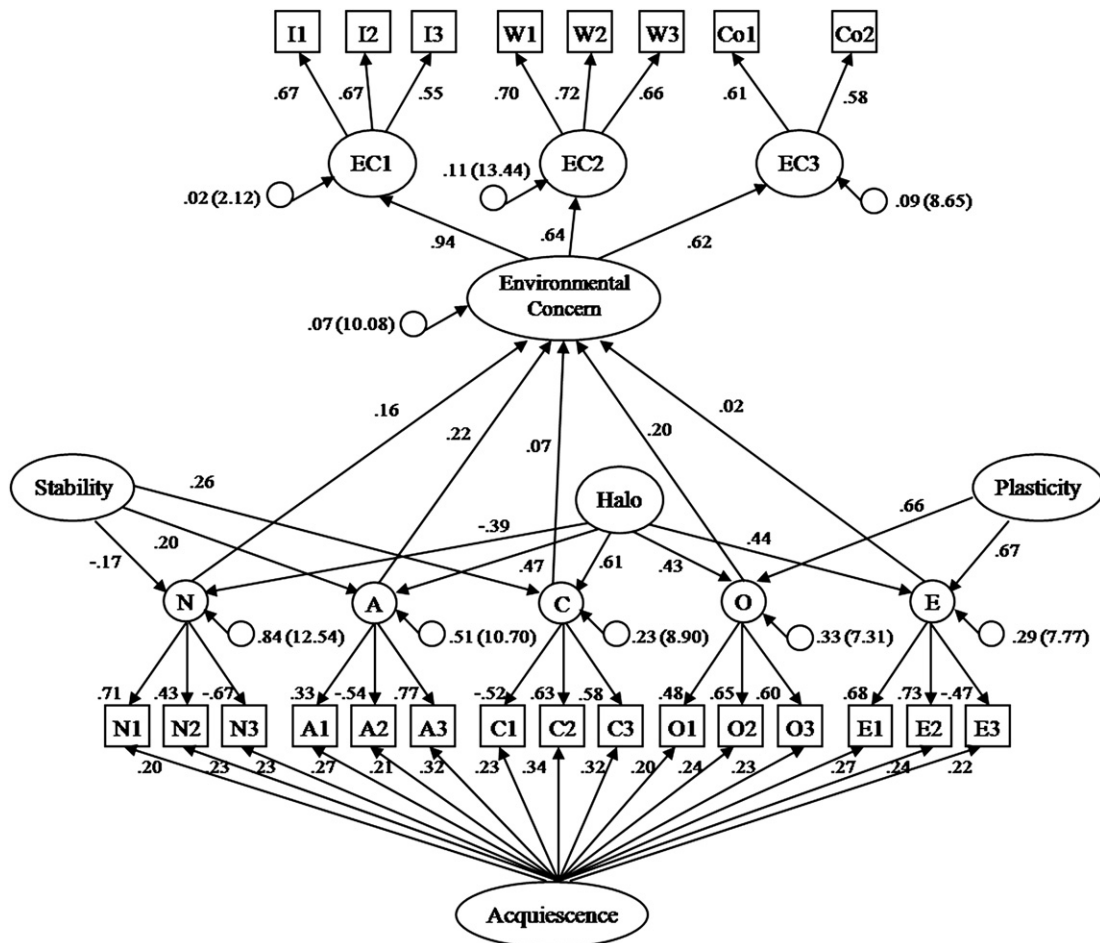
The model and estimated parameters are presented in Fig. 1. The latent environmental concern factor was strongly related to each of the three item-based environmental factors, including “importance of environmental protection” ( $\beta = .94$ ), “worried about environment” ( $\beta = .64$ ), and “environmentally conscious” ( $\beta = .62$ ). Environmental concern was in turn significantly predicted by individual differences in the Big Five personality traits. In particular, greater environmental concern was significantly associated with higher levels of Agreeableness ( $\beta = .22$ ), Openness ( $\beta = .20$ ), Neuroticism ( $\beta = .16$ ), and Conscientiousness ( $\beta = .07$ ). In contrast, no significant relationship was observed with Extraversion ( $\beta = .02$ ).

### 3.3. Demographic variables

Age, gender, and household income were added to the model in order to examine the importance of demographic variables in predicting environmental concern. A regression line predicting the latent environmental concern factor was drawn from each of the demographic variables. Including these variables did not change the relationships between personality and environmental concern, although it did decrease the overall fit of the model (CFI = .84; RMSEA = .053; SRMR = .06). Nonetheless, significant relationships were observed, with environmental concern being positively associated with age ( $\beta = .13$ ) and negatively with household income ( $\beta = -.06$ ). Women also displayed higher levels of environmental concern than men ( $\beta = .07$ ), consistent with previous research (Davidson & Freudenburg, 1996).

### 3.4. Examination of possible gender moderation

Because the sample contained a large number of both males and females, it was possible to examine the possible interactions between gender and personality in the prediction of environmental concern. The model depicted in Fig. 1 was therefore extended to a multiple-groups confirmatory factor analysis, with the model being estimated simultaneously for males and females. The model again demonstrated acceptable fit when no equality constraints were imposed across groups (CFI = .91; RMSEA = .031; SRMR = .054). Constraining the factor loadings and structural covariances to be equal across the groups did not significantly reduce model fit (CFI = .91; RMSEA = .030;



**Fig. 1.** Structural regression model with the Big Five traits predicting environmental concern. Halo represents an evaluative bias factor. Acquiscence represents acquiescence bias in scale usage. Stability and Plasticity represent the two higher-order Big Five traits. EC1 = “Importance of Environmental Protection” items; EC2 = “Worried about Environment” items; EC3 = “Environmentally Conscious” items. Structural error terms are presented for all endogenous variables, with the critical ratios in parentheses. Measurement error terms were omitted from the figure to improve readability.

SRMR = .056;  $\Delta\chi^2 = 31.67, \Delta df = 26, p = .20$ ). Conversely, with this fully constrained model in place, allowing the regression weights of the Big Five domains on the Environmental Concern variable to vary freely did not improve model fit (CFI = .91; RMSEA = .031; SRMR = .056;  $\Delta\chi^2 = 2.73, \Delta df = 5, p = .74$ ). The relationship between the Big Five and environmental concern thus did not appear to be moderated by gender.

#### 4. Discussion

As in previous research, greater environmental concern was related to higher levels of the Big Five personality traits of Agreeableness and Openness (Hirsh & Dolderman, 2007). These relationships appear to be relatively robust, given that they were replicated using different measures, obtained from an adult rather than student population, and in a German rather than Canadian sample. Additionally, these effects were observed despite the removal of error variance through structural equation modeling. The current study thus provides additional support for the importance of these two personality traits in predicting environmental attitudes, while further demonstrating that their importance does not appear to be moderated by gender.

Both Agreeableness and Openness have been related to the higher-order personal value of self-transcendence, reflecting an expanded sense of self and a greater concern for others (Olver & Mooradian,

2003; Roccas et al., 2002). Agreeableness, for instance, is related to higher levels of empathy (Ashton, Paunonen, Helmes, & Jackson, 1998), which is thought to support pro-environmental motives (Schultz, 2000). Individuals who are lower in Agreeableness tend to be more selfish generally speaking, and are less concerned about the welfare of others. Openness, meanwhile, is associated with increased cognitive ability and flexibility in thought (DeYoung, Peterson, & Higgins, 2005), potentially affording a broader perspective on humanity’s place in the larger ecology and a greater aesthetic appreciation of natural beauty. Less open individuals, in contrast, are likely to have a narrower and more conservative perspective on nature’s value.

An unexpected finding was the effect of Neuroticism, with more neurotic individuals demonstrating significantly higher levels of environmental concern. Although this relationship was not found in the preliminary study that employed the Big Five (Hirsh & Dolderman, 2007), it was previously found to predict support for environmental preservation (Wiseman & Bogner, 2003) when measured with the Eysenck Personality Questionnaire (Eysenck & Eysenck, 1975). One explanation for this finding is that neurotic individuals tend to be more worried about negative outcomes in general, and so concern about the environment may reflect anxiety about the consequences of environmental degradation (whereas emotionally stable individuals would potentially experience less affective disturbance when thinking about this topic). It is thus

possible that neurotic individuals would demonstrate a more egoistic form of environmental concern, rather than an altruistic one (Schultz, 2001).

A second finding that was unpredicted from previous research on this topic is the fact that Conscientiousness had a small but significant positive association with environmental concern. Given the relatively small magnitude of this relationship, it is perhaps unsurprising that the previous study employing a smaller sample size did not uncover this result. The importance of Conscientiousness for environmental concern is consistent with studies that link this trait to higher levels of social investment and prudent rule-adherence in general (Lodi-Smith & Roberts, 2007). Highly conscientious individuals might be expected to carefully follow social guidelines and norms for appropriate environmental action, whereas less conscientious individuals might be more willing to “cut corners” when it comes to environmentally responsible behavior.

The current analysis has a number of strengths over previous inquiries into the relationship between personality and environmental concern. First, the large sample provided by the longitudinal GSOEP study allowed for a more detailed structural analysis of the relevant variables. Second, the sample was more representative of the larger population in terms of age and gender distribution. While previous research has mostly employed undergraduate students, the current sample had a much broader age range that stretched further into the lifespan. Third, the inclusion of multiple time-lagged measures allowed for an examination of the personality predictors of environmental concern across long periods of time.

Despite the strengths of the study, there are also some noteworthy limitations. These limitations are primarily related to the measures that were administered as part of the GSOEP project. In particular, while the 15-item BFI-S provides a good measure of the broad Big Five factors, it does not allow for an assessment of lower-order personality traits. It is possible that certain aspects of each Big Five domain would be more strongly related to environmental concern than others, but this could not be examined in the current data. Similarly, the measures of environmental concern were derived from the available items, but they did not reflect a comprehensive coverage of the entire domain of environmental attitudes. It is certainly possible that personality traits may be differentially related to the various aspects of environmental concern (Milfont & Duckitt, 2004; Schultz, 2001; Wiseman & Bogner, 2003). Future research could explore these possibilities by employing more detailed measures of personality and environmental concern. Nonetheless, the current study provides support for the importance of personality traits in relation to environmental attitudes, and thereby provides a useful framework for more targeted investigations into the processes underlying these relationships.

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