

The big five personality traits and environmental concern: the moderating roles of individualism/collectivism and gender

Abbas Abdollahi^{1*}, Simin Hosseinian¹, Samaneh Karbalaee², Ahmad Beh - Pajooch³, Yousef Keshavarz⁴ & Mahmoud Najafi⁵

¹ Department of Counseling, Faculty of Education and Psychology, Alzahra University, Tehran, Iran.

² Faculty of Environmental Science, Universiti Putra Malaysia, Serdang, 43400, Selangor, Malaysia.

³ Faculty of Education and Psychology, University of Tehran, Iran.

⁴ Department of Management, Islamic Azad University, Neyriz Branch, Fars, Iran.

⁵ Department of psychology, Semnan University, Semnan, Iran.

Received 24.01.2017; Received revised 25.05.2017; Accepted 11.06.2017
Available online 30.06.2017

Environmental pollution has become a serious challenge for humanity and the environment. Therefore, this study aims to examine the relationships between the Big Five personality traits, individualism, collectivism, participant's age, and environmental concern, and testing the moderating roles of individualism/collectivism and gender in the relationship between the Big Five personality traits and environmental concern. In this quantitative study, the multi-stage cluster random sampling method was used to recruit a total of 1,160 respondents (614 females and 546 males) from Kuala Lumpur, Malaysia. Structural Equation Modeling proved that respondents of high neuroticism, conscientiousness, extraversion, collectivism, and older ages were conscious of the environmental quality. Also, the findings showed that individualism, collectivism, and gender emerged as significant moderators in the link between the Big Five personality traits and the environmental concern.

Keywords: Environmental concern, Big Five, individualism/collectivism.

Address of correspondence: Abbas Abdollahi, Department of Counseling, Faculty of Education and Psychology, Alzahra University, 1993891176, Tehran, Iran.
E-mail: abdollahi.abbas58@gmail.com

Introduction

Environmental pollutions such as air pollution, water pollution, soil contamination, etc. are common nowadays. These pollutions will cause devastating impacts on environment and human activities (Parizanganeh, Lakhan, Yazdani, & Ahmad, 2011). Studies related to environmental were normally conducted in Western countries (Newman & Fernandes, 2015; Thieme, Royne, Jha, Levy, & Barnes McEntee, 2015). However, the environmental concern in Malaysia as a developing country was given little attention. Kuala Lumpur (Capital of Malaysia) is known as one of the most polluted cities in the world (Energy Information Administration., 2002). In addition, studies of environmental concern were mostly related to green products and cleaner productions

(Kieckhäfer, Wachter, & Spengler, 2016; Kirmani & Khan, 2016) and lesser efforts have been devoted to investigate the relationships between psychological factors, attitudes and environmental concern. Therefore, this study aimed to shed some lights on how personality characteristics (i.e. extraversion, neuroticism, agreeableness, conscientiousness, and openness), individualism, and collectivism influence on human awareness in environmental concerns. This study also examined the moderating roles of gender and individualistic/collectivistic orientations on the relationships between personality characteristics and environmental concern. This study was motivated from Hirsh' study (2010), whereby the author has suggested that there were significant relationships between the Big Five personality traits and the environmental concern. The current study deviated from

the previous study (Hirsh, 2010), in terms of the moderating tests of gender, individualism, and collectivism on the relationships between the Big Five personality traits and the environmental concern in Malaysia.

Barr (2007) has identified situational variables, environmental attitudes, and psychological traits as important factors in environmental concern. Situational variables are related to contextual, structural, or socio-demographic factors that would influence a decision-making process (Barr, 2007, p. 438-439). Environmental attitudes are related to concerns on preserving/restoring/improving an environment. Conservative individuals (i.e. individualistic, in contrast to bio-spheric concern) are generally not environmental-friendly (Swami, Chamorro-Premuzic, Snelgar, & Furnham, 2011). Hirsh (2010) found that there was a direct relationship between environmental concerns and psychological traits. For example, individuals who are more open to change and altruistic are more likely to be environmental-friendly (Barr, 2007). Similarly, individuals who are conscious on environmental issues are more likely to pursue a pro-environmental behavior (Dunlap, Van Liere, Mertig, & Jones, 2000; Swami et al., 2011). Eco-minded individuals have numerous ways of maintaining an environment, such as engaging in waste management activities and shaping their lifestyles in accordance with the pro-environmental behaviors.

Several researchers have studied the roles of psychological and behavioral factors on environmental issues (Kollmuss & Agyeman, 2002; McCright & Xiao, 2014; Milfont & Sibley, 2012; Ojedokun, 2011; Swami et al., 2011). For instance, Swami and Colleagues (2011) examined the roles of psychological traits in household waste management behaviors. According to them, there are significant positive relationships between conscientiousness, older age, and better household waste management. Meanwhile, agreeableness, conscientiousness and openness to experience have been identified as significant predictors of pro-environmental behaviors (Milfont & Sibley, 2012). Ojedokun (2011) have found that most Nigerians were practicing altruism and were aware on environmental quality. In addition, Karbalaie, Abdollahi, Abu, Nor and Ismail (2013) have found that effective problem-solving skills and internal locus of control were significant predictors of waste prevention behaviors among Malaysians. Indeed, personality has a great influence on motivation, belief, value and attitude related to environmental behaviors (Karbalaie, Abdollahi, Momtaz, & Abu Talib, 2014).

Personality traits and environmental concern

From the aforementioned literatures, it seems that the number of empirical study related to personality traits and environmental issues among Malaysian is limited. Therefore, this paper attempted to fill this gap by examining the relationship between the Big Five dimensions of personality (i.e. neuroticism, conscientiousness, agreeableness, openness to experience and extraversion) and the environmental concerns among Malaysian. Neuroticism is defined as a negative emotion that is associated with anxiety, depression, inferiority, unhappiness, and low self-esteem (Costa & McCrae, 1989). Previous studies have shown that neuroticism was positively associated with pro-environmental behaviors and environmental preservation (Boeve-de Pauw, Donche, & Van Petegem, 2011; Milfont & Sibley, 2012). Hirsh (2010) explained that neurotic individuals concerned about

negative outcomes (e.g. the negative outcomes of environmental degradation). More studies must be conducted to assess the influence of neuroticism on pro-environmental behaviors. Therefore, this study was conducted to test whether neuroticism correlates with environmental concerns. Conscientiousness is defined as a tendency to be organized and continuing goals (Costa & McCrae, 1989). Characteristics are associated to conscientiousness included (a) orderliness, responsibility, and perseverance (MacCann, Duckworth, & Roberts, 2009); (b) self-discipline, perfectionism, and punctuality (Lee & Ashton, 2005); and (c) thrift, efficiency, and achievement striving (Gudmunson & Beutler, 2012; Roberts, Chernyshenko, Stark, & Goldberg, 2005).

Swami and Colleagues (2011) have showed that conscientiousness, intellectualism, and need for achievement were associated to pro-environmental attitudes due to the fact that conscientious individuals would adhere to rules and regulations related to environmental protection (Hirsh, 2010). In this regard, this study examined the relationship between conscientiousness and environmental concerns. Agreeableness refers to the tendency to be compliant, pleasurable, cooperative, high caring and concern for well-being of family, members, and friends. In this regard, the study tested whether agreeableness has a significant relationship with environmental concerns. Openness to experience refers to the tendency to embrace universalistic attitudes. These individuals tend to look for novel solutions and gains (Milfont & Sibley, 2012). So, the study was conducted to test whether openness to experience is associated with environmental concerns. Extraversion is defined as a tendency to be more outgoing, energetic, and assertive (Milfont & Sibley, 2012). Individuals of such behaviours tend to maximize gains from social relations. Therefore, the study was aimed to test whether extraversion has a significant relationship with environmental concerns.

Collectivistic and Individualistic Values

Individualistic individuals are selfish, having poor relations with other individuals, giving priority to individual aims over group aims, and it is assumed that everyone is responsible for taking care of own family alone. In contrast, individuals in a collectivistic society believe that strong and cohesive groups would protect them during their day-to-day activities and they emphasize the aims of the group over individual aims. As noted by Ng and Soutar (2007), culture does not necessarily correspond to national boundaries. In fact, individuals might selectively develop their personal characteristics, communication styles, and preferences from both individualistic and collectivistic cognitive structures in different situations (Harry Charalambos Triandis, 1995). Thus, it seems unfair to assume that everyone in an individualistic/collectivistic society is an individualist/collectivist (Woodcock, 2010). In other words, regardless of geographical location, individuals maintain their own personal set of values. Some individuals may emphasize the importance of group (collectivism), and others may emphasize the importance of individual (individualism).

Due to these value differences, the attitudes towards environment may be different among these individuals as well. Since individuals apply their personal values, attitudes, and beliefs to the environment issues, it is likely the levels of intention and attitude towards environment may differ between individuals with collectivistic and

individualistic values. In line with this, it is necessary to investigate the factor such as the diversity of behaviors (Malaysian) in terms of individualism and collectivism. So, this study conceptualized the cultural values of respondents at the individual level instead of the national level.

Furthermore, individualistic or collectivistic orientations correlate strongly to environmental awareness. For example, Kim and Choi (2005) found that collectivistic value would influence the belief of consumer (i.e. green buying behavior). Likewise, Cho, Thyroff, Rapert, Park, and Lee (2013) found that these orientations would significantly influence the perceived consumer effectiveness. McCarty and Shrum (2001) also found that there was a significant relationship between collectivism, internal locus of control, and belief on the importance of recycling behavior. In general, individualistic individuals consider recycling costly and perceive recycling as contributing to their personal goals (McCarty & Shrum, 2001). On the other hand, collectivistic individuals are positive on recycling and they believe that their behavior would improve the environment quality (McCarty & Shrum, 2001). It is conceivable that if individuals think collectivistically or individualistically regarding the environment, their behaviors and attitudes toward the environment are different.

Previous studies have highlighted the significant correlations between the Big five dimension of personality and the environmental concerns in Western countries. Indeed, most studies focused on the direct relationships between the Big five dimension of personality and the environmental concerns (Swami et al., 2011), with no consideration on the possibility of moderating role of cultural orientation. Cultural orientation can influence the process of information, belief, pattern of thinking, and behavior. Environmental concerns are strongly influenced by a set of beliefs, patterns of thinking, and behavioral intentions on environmental activities (Schmitt, Realo, Allik, & Voracek, 2008). It is conceivable that individualists pay lesser attention to the environment because they focus on own benefits rather than group benefits. On the other hand, collectivists focus on group benefits, and they have positive attitudes towards the environment (Kim & Choi, 2005). These limitations must be properly addressed in the existing literatures. Therefore, the current study aimed to examine the relationships between Big five dimensions of personality, cultural orientation, and environmental concerns as well as to determine the moderating roles of cultural orientation (individualism/collectivism) and gender in the relationship between the Big five dimensions of personality and environmental concern among Malaysian).

Method

Participants

The total number of participants was 1,160. They were recruited from Kuala Lumpur, Malaysia where females and males constituted 53% (614) and 47% (546), respectively. The ages of the participants ranged between 15 years – 76 years (Mean = 43.44; SD = 14.37). The age distribution of participants closely represents the age distribution of Malaysia's population (see Table 1). With regards to the education level of respondents, 29.8% (346) of them had high-school certificate, 14.7% (170) of them were a Diploma holders, 23% (267) of them were bachelor's degree holders, 8% (93) of them were Master/PhD holders,

12% (139) of them were not educated, and 12.5% (145) of them did not indicate their educational levels.

Table 1. Comparing the age distribution of the sampled respondents with that of Malaysia's national population.

Age groups of respondents	Number of respondents	%	Malaysia's national population by age group (in thousands)	
			Freq.	%
<25	602	51.90	35417	50.24
25-34	290	25.00	12777	18.12
35-44	152	13.11	9010	12.78
45-54	79	6.81	6277	8.91
55	37	3.18	7006	9.95
Total	1160	100	70487	100

Measures

The *Goldberg (1992) Questionnaire* was adopted to measure the Big Five personality of individuals (i.e. neuroticism, conscientiousness, agreeableness, openness to experience and extraversion). In general, this questionnaire has 50 items with 5-point Likert's scales ranging from 1 (very inaccurate) to 5 (very accurate). The alpha value (α), Average Variance Extracted (AVE) and Composite Reliability (CR) for the Big Five personality in the current reliability test were reasonable, i.e. neuroticism (α : 0.72, AVE: 0.53, and CR: 0.71), conscientiousness (α : 0.73, AVE: 0.52, and CR: 0.72), agreeableness (α : 0.81, AVE: 0.63, and CR: 0.81), openness to experience (α : 0.78, AVE: 0.61, and CR: 0.76) and extraversion (α : 0.70, AVE: 0.51, and CR: 0.71).

The *Individualistic and Collectivistic Orientation Questionnaire* was developed by Triandis and Gelfand (1998) with 16 items measured in four distinct cultural patterns: horizontal individualism (seeing the self as fully autonomous, and believing that equality exists between individuals), vertical individualism (seeing the self as fully autonomous, but accepting that inequality will exist among individuals), horizontal collectivism (seeing the self as part of a collective but perceiving all members within a group are equal), and vertical collectivism (seeing the self as a part of a collective and willing to accept inequality within the group members). All items were evaluated based on a 7-point Likert scale ranging from 1 (never or definitely no) to 7 (always or definitely yes). The literature recommended the sum of horizontal individualism subscale and vertical individualism subscale as individualism and horizontal collectivism subscale and vertical collectivism subscale as collectivism (Cho, Thyroff, Rapert, Park, & Lee, 2013). Thus, the sum of two scores was utilized for evaluating individualistic and collectivistic orientation dimensions in this study. In the present study, the questionnaire demonstrated a good reliability coefficient with α of 0.71, Average Variance Extracted (AVE) of 0.53, and Composite Reliability (CR) of 0.72.

The questionnaire developed by Hirsh (2010) was used to measure the environmental concern in three dimensions, i.e. environmentally conscious, importance of environmental protection, and worried about environment. The questionnaire has a 5-point Likert scale ranging from 1 (strongly disagree) to 5 (strongly agree). In this test, α ,

Average Variance Extracted (AVE) and Composite Reliability (CR) were 0.73, 0.60 and 0.72, respectively.

Questionnaire translation and pilot study

The questionnaires were translated from English into Malay language. In addition, back-translation was performed in order to ensure the quality of the translation. For this purpose, three experts from Faculty of Psychology, Universiti Putra Malaysia were consulted and the questionnaires were duly modified according to their suggestions. Face and content validity tests were also conducted to ensure its adaptability in local environment.

In order to assess the internal consistency of these modified questionnaires, a pilot test was conducted on 60 respondents. During the pilot test, the respondents were asked to indicate if ambiguities exist in the questionnaires. In general, the respondents were positive on the general structure and presentation of the questionnaires. The reliability coefficients (α) of all variables were acceptable, ranging from 0.71 to 0.84.

Procedure

The eleven districts in Kuala Lumpur were categorized into five groups (North, South, Center, East, and West). From each group, a municipal district was randomly chosen and from each municipal district, a neighborhood was randomly selected. Researchers were instructed to collect the information from home's residents. Questionnaires were completed by the residents. Each package contained an introductory letter and four questionnaires (one of them was a demographic questionnaire). They were also informed that the participation in this study was voluntary, and they could withdraw from the study anytime. Furthermore, each participant was identified by a code number only (anonymous). A total of 1450 questionnaires were distributed, where 1160 (80%) of them were usable questionnaires and 290 (20%) of the participants refused to complete the questionnaires.

Statistical analyses and data preparation

Structural Equation Modeling (SEM) was preferable because: (a) it improves statistical estimation by taking into account measurement error in the estimation process; (b) it enables the testing of multiple relationships simultaneously; (c) it tests much more complex models such as testing moderation, and provides goodness of fit indices for the models tested; and (d) it provides better identification for validity and reliability of the instruments. Therefore, Average Variance Extracted (AVE) and Composite Reliability (CR) were used to measure the validity and the reliability of instruments (Kline, 2010). $AVE \geq 0.5$ shows high convergent validity (Fornell & Larcker, 1981) and $CR \geq 0.7$ indicates high internal consistency (Hair et al., 2010).

The missing data were addressed by the multiple imputation methods in AMOS version 20 (missing data were ranging from 1.74 to 4.84). The data was considered to be normally distributed because the skewness values were between the minimum of -0.88 and the maximum of 1.62 and the Kurtosis values were ranging from the minimum of -1.15 to the maximum of 1.13 for all variables. According to Byrne (2010), if the skewness value is between -2 to +2 and the Kurtosis value is between -7 to +7, the data is considered to be normally distributed. The goodness of fit indices, i.e. Chi Square/Degree of Freedom Ratio (CMIN/DF), Comparative-Fit Index (CFI),

Goodness-of-Fit Index (GFI), and Tucker-Lewis Index (TLI) were used for testing the model fit. The model fit indices should be ≥ 0.90 (Kline, 2010). Furthermore, the Root Mean Squared Error of Approximation (RMSEA) value that ranges between 0.03 and 0.08 is considered as an acceptable goodness of fit (Kline, 2010).

Results

Descriptive statistics

Table 2 reports the inter-correlations between environmental concern, neuroticism, conscientiousness, agreeableness, openness to experience, extraversion, individualism and collectivism for all samples.

Goodness of fit

The measurement model considered neuroticism, conscientiousness, agreeableness, openness to experience, extraversion, individualism, and collectivism as latent variables and age as observed variable. The associated Goodness-of-Fit indices were: CMIN/DF= 2.21, $p > .01$, CFI= 0.92, GFI= 0.91, TLI= 0.90 and RMSEA= 0.07. Based on the rule of thumb recommended by Kline (2010), these values are acceptable. Thus, the data showed an acceptable model fit.

Structural model

The structural model in Figure 1 shows the standardized regression weight of the relationship between exogenous variables (neuroticism, conscientiousness, agreeableness, openness to experience, extraversion, individualism, collectivism, and age) and endogenous variable (environmental concern). The result showed that neuroticism, conscientiousness, extraversion, individualism, collectivism, and age had significant relationships with environmental concern. However, the finding indicated no significant relationship between agreeableness and openness to experience with environmental concern. Moreover, the analysis showed that 31.0% of variance in environmental concern was due to the independent variables entered into the structural model.

The moderating effect of individualism and collectivism

Multi-group analysis was conducted to examine the moderating effects of individualism and collectivism. The model showed the goodness-of-fit indices for the variant and invariant models (Table 3). Furthermore, the full variant model group produced a smaller AIC (3768.817) compared to the invariant model group (3805.485). Therefore, there are some differences between individualism and collectivism based on the size and the level of significant relationships in the hypothesized paths.

In order to evaluate the effect of the moderator, the chi-square difference between the variant model (i.e. all structural paths were allowed to change) and the invariant model (i.e. all structural paths were fixed) was computed. If $p < 0.05$, the hypothesized model varies as a function of moderator. In addition, Critical Ratios of Differences (CRD) was evaluated by dividing the difference between two estimates. Following this, the standard error of the difference was evaluated to compare the individual paths across two groups. Values greater than ± 1.96 and ± 2.58 show that the relationships are statistically significant at 0.05 and 0.01 levels, respectively. To test the moderation roles of individualism and collectivism, the sample data

was divided based on the median split in individualism (21.12) and collectivism (17.73).

The findings showed that the relationship between neuroticism and environmental concern for respondents from high individualism group was not significant ($\beta = 0.071$). However, the relationship for respondents from low individualism group was significant ($\beta = 0.265$; CRD = 2.84, $p < 0.01$) (see Table 4). The results also demonstrated that the relationship between extraversion and environmental concern for respondents from high individualism group was not significant ($\beta = 0.094$) (17). Meanwhile, the relationship for respondents from low individualism group was significant ($\beta = 0.156$; CRD = 2.81, $p < 0.01$) (see Table 4). Therefore, extraversion was more pronounced in respondents from the low individualism group. The findings showed that the relationship between openness to experience and environmental concern for respondents from high collectivism group was significant ($\beta = 0.176$). However, the relationship for respondents from low collectivism group was not significant ($\beta = 0.061$; CRD = 2.72, $p < 0.01$) (see Table 5). The results also demonstrated that the relationship between extraversion and environmental concern for respondents from the high collectivism group was significant ($\beta = 0.184$). But, the relationship for respondents from the low collectivism group was not significant ($\beta = 0.096$; CRD = 2.61, $p < 0.01$) (see Table 5).

The moderating effect of gender

The comparison between “the variant model” and “the invariant model” showed that the variant model with ($\Delta \chi^2 (629.13)$, $df = 666$, $p < 0.01$, RMSEA = 0.060, CFI = 0.903, GFI = 0.891, NFI = 0.901), and the invariant model with ($\Delta \chi^2 (668.82)$, $df = 703$, $p < 0.01$, RMSEA = 0.058, CFI = 0.891, GFI = 0.863, NFI = 0.785) were significant. However, the variant model was better than the invariant model because the chi-square was smaller (Davis, 2008;

Hair, Black, Babin, Anderson, & Tatham, 2006). According to the invariant model, the findings showed that the impact of differences across gender was significant.

The results revealed that there was a significant relationship between neuroticism and environmental concern for female respondents ($\beta = 0.341$), while the path hypothesis for male respondents was not significant ($\beta = 0.063$) (see Table 6). Therefore, the moderating effect of gender on the path relationship between neuroticism and environmental concern was proven (CRD = 3.24, $p < 0.01$). Our finding supports the results obtained from a previous study that female scored higher in the neuroticism category (Hirsh, 2010). In addition, the results revealed that there was a significant relationship between conscientiousness and environmental concern for female respondents ($\beta = 0.271$). However, the path hypothesis for male respondents was not significant ($\beta = 0.111$) (see Table 6). Therefore, the moderating effect of gender on the path relationship between conscientiousness and environmental concern was supported (CRD = 1.98, $p < 0.05$). The current results agreed with those reported by Swami et al. (2011) that female scored higher in the conscientiousness category. The findings showed that there was a significant relationship between collectivism and environmental concern for female respondents ($\beta = 0.197$). However, the path hypothesis for male respondents was not significant ($\beta = 0.128$) (see Table 6). Therefore, the moderating effect of gender on the path relationship between collectivism and environmental concern was supported (CRD = 3.48, $p < 0.01$). This study found that individuals with a predominant personality of collectivism placed more concerns on environment than those with a predominant personality of individualism. The results showed that the use of gender factor was not able to moderate the relationships among agreeableness, openness to experience, extraversion, and individualism with environmental concern (see Table 6).

Table 2. Correlations between study variables for overall sample, and the mean, SD and actual range

Variables	1	2	3	4	5	6	7	8	9
(1) Environmental concern	1	.171**	.132**	.051	.081*	.139**	-.164**	.237**	.351**
(2) Neuroticism		1	-.264*	-.263*	-.165*	-.197*	.121*	-.223**	.088*
(3) Conscientiousness			1	.281*	.119*	.112*	.181*	.252**	.078*
(4) Agreeableness				1	.213*	.271*	.218*	.318**	.124*
(5) Openness to Experience					1	.236*	.123*	.213*	.091*
(6) Extraversion						1	.135*	.266*	.081
(7) Individualism							1	-.321*	.127*
(8) Collectivism								1	.215*
(9) Age									1
M	7.10	6.06	6.95	4.27	8.54	7.23	30.58	28.17	43.44
SD	4.21	3.58	4.77	4.72	4.66	3.78	6.14	6.32	14.37
Actual range	1-15	1-10	1-10	1-10	1-10	1-10	1-55	1-55	15-76

Notes: ** $p < .001$, * $p < .05$.

Table 3. Fit Indices for Individualism and Collectivism

Model	NPAR	CMIN	DF	P	CMIN/DF	IFI	TLI	CFI	RMSEA
Variant Model (Individualism)	685	2269.48	2138	0	1.061	0.914	0.907	0.913	0.04
Invariant Model (individualism)	493	2396.82	2020	0	1.186	0.881	0.894	0.901	0.062
Variant Model (Collectivism)	685	2112.42	2214	0	0.953	0.934	0.927	0.933	0.04
Invariant Model (Collectivism)	493	2436.82	2010	0	1.211	0.901	0.901	0.903	0.072

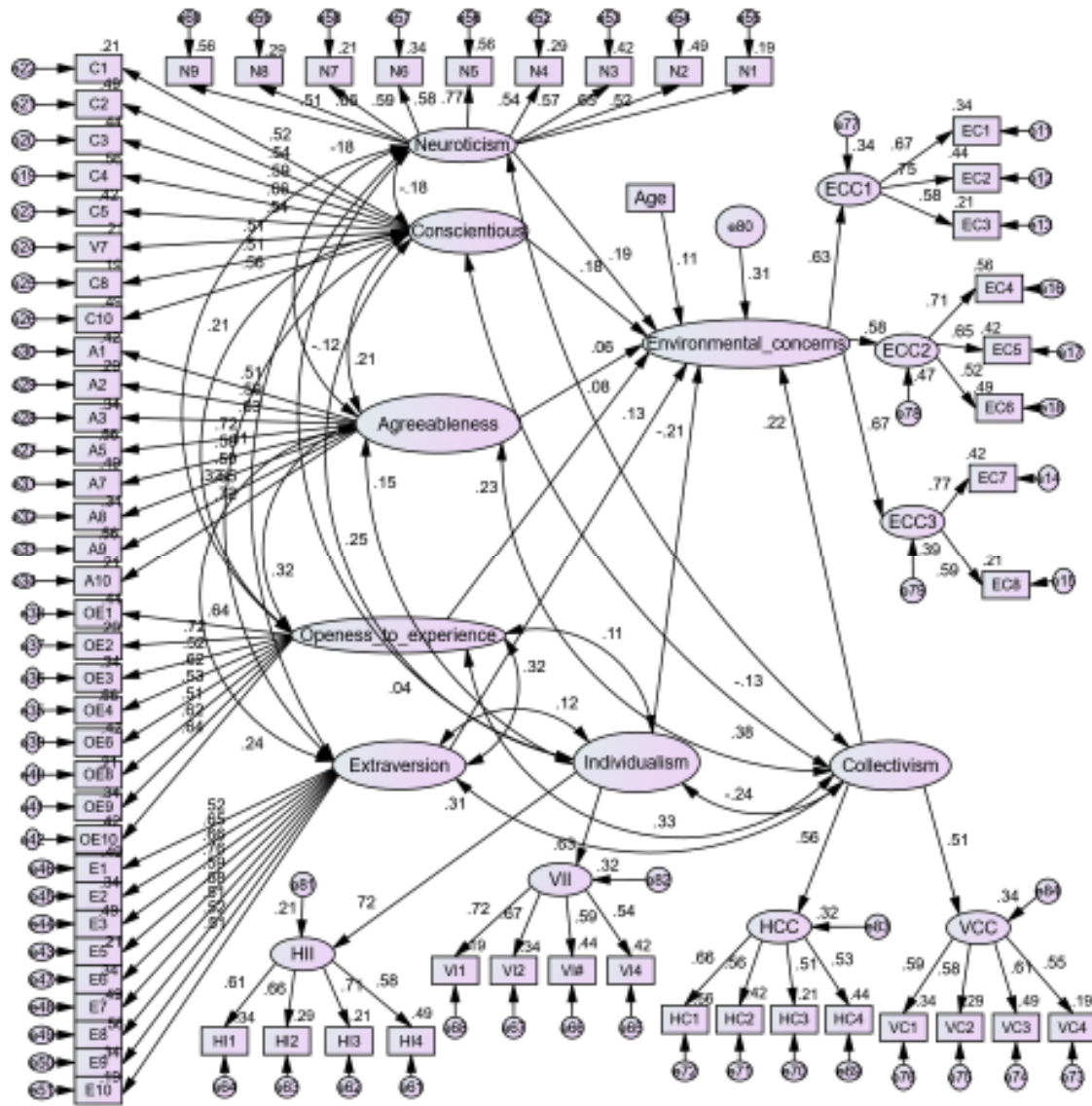


Figure 1. Structural model of environmental concerns

Table 4. Standardized Regression Weights

Hypothesis			S.E. ¹	C.R. ²	Standard Estimate
Environmental Concern	<---	Neuroticism	.412(.388)	2.045(2.499)	.265 ** (.071)
Environmental Concern	<---	Conscientiousness	.184(.115)	2.434(2.569)	.313** (-.274**)
Environmental Concern	<---	Agreeableness	-.005(-.011)	-.152(-.218)	.071(.061)
Environmental Concern	<---	Openness to Experience	.075(.042)	.367(.152)	.076(.081)
Environmental Concern	<---	Extraversion	.279(.257)	2.017(2.421)	.094 (.156**)

Notes: * $p < .05$, ** $p < .01$, without* = Not significant. Results for the high individualism group are presented first, and results for the low individualism group are presented in a parenthesis. 1: Standard Error, 2: Critical Ratio

Table 5. Standardized Regression Weights

Hypothesis			S.E. ¹	C.R. ²	Standard Estimate
Environmental Concern	<---	Neuroticism	.425(.543)	2.132(2.219)	.213 ** (.243**)
Environmental Concern	<---	Conscientiousness	.284(.115)	2.123(2.169)	.211** (.214**)
Environmental Concern	<---	Agreeableness	.125(.111)	.152(.118)	.171*(.161*)
Environmental Concern	<---	Openness to Experience	.275(.142)	.467(.152)	.176*(.061)
Environmental Concern	<---	Extraversion	.439(.157)	2.037(2.121)	.184* (.096)

Notes: * $p < .05$, ** $p < .01$, without* = Not significant. Results for the high collectivism group are presented first, and results for the low collectivism group are presented in a parenthesis. 1: Standard Error, 2: Critical Ratio

Table 6. Standardized Regression Weights (Gender)

Hypothesis			S.E. ¹	C.R. ²	Standard Estimate
Environmental Concern	<---	Neuroticism	.202(.188)	1.255(1.199)	.341* (.063)
Environmental Concern	<---	Conscientiousness	.274(.214)	2.124(2.119)	.271* (.111)
Environmental Concern	<---	Agreeableness	.205(.211)	.152(.218)	.111*(.101*)
Environmental Concern	<---	Openness to Experience	.175(.342)	.367(.152)	.112*(.121*)
Environmental Concern	<---	Extraversion	.388(.377)	2.316(2.201)	.144* (.121**)
Environmental Concern	<---	Individualism	.481(.397)	-1.384(-1.287)	-.167*(-.178*)
Environmental Concern	<---	Collectivism	.088(.079)	2.784(2.2.697)	.197*(.128)

Notes: * $p < .05$, ** $p < .01$, without* = Not significant. Results for females are presented first, and results for males are presented in a parenthesis. 1: Standard Error, 2: Critical Ratio

Discussion

The present study aimed to examine the relationships between the Big five dimensions of personality, individualism, collectivism, and the environmental concern. The results of this study showed that greater neuroticism, higher conscientiousness, higher extraversion, and higher collectivism were valuable predictors of environmental concern.

By closely inspecting our findings, a number of noteworthy findings can be revealed. Firstly, neuroticism, conscientiousness, and extraversion were directly associated with environmental concern due to positive relationship between the constructs. The direct relationship between neuroticism and environmental concern may be due to the concerns of neurotic individuals in the detrimental environmental pollutions (Hirsh, 2010). In addition, the findings revealed that females were more neurotic than males (Hirsh, 2010).

The result also indicated a significant and direct association between conscientiousness and environmental concern due to the fact that conscientious individuals would obey the social guidelines and norms of environmental protection (Swami et al., 2011). Thus, our finding supported the previous results that proved conscientiousness was associated with self-discipline, dutifulness, achievement striving, and conscience (Bienvenu et al., 2004; John, Naumann, & Soto, 2008; Pearman & Storandt, 2005). Realizing the fact that pro-environmental behavior is an ethical behavior, conscientious individuals place more concerns on human and societal rights. Conscientious individuals are expected to follow social rules and norms of environmental protection even though some conscientious individuals would “cut corners” when it comes to environmentally responsible behavior (Milfont & Sibley, 2012). Thus, individuals with high conscientiousness are more interested to engage in pro-environmental behaviors (Swami et al.,

2011). In addition, the findings of our results demonstrated that females were more conscientious than males. This finding was in agreement with that reported by Swami et al. (2011).

Moreover, the findings revealed a significant and positive relationship between extraversion and environmental concern. The direct association between extraversion and environmental concern may be due to the nature of extroverted individuals (Zhang, Howell, & Iyer, 2014). In addition, the positive association between extraversion and environmental concern may be associated to propensities of extroverted individuals in engaging social activities (Zhang et al., 2014). Extroverted individuals are more outgoing, energetic, optimistic, sociable and assertive (Boeve-de Pauw et al., 2011; Zhang et al., 2014). Extroverts would apply effective solutions for solving environmental problems because they are aware that environmental pollutions are detrimental to public health. Besides, our findings showed that the score for female group was higher than that of male group in the extraversion category. This finding was consistent with Zhang et al. (2014).

In general, the positive relationship between neuroticism and environmental concern was stronger amongst individualistic respondents than collectivistic respondents. Meanwhile, extraversion was higher within the collectivists. In this study, a research model was proposed to study the moderating effect of individualism-collectivism. It was found that the cultural dimension of individualism-collectivism moderated the relationships between the Big five dimension of personality and the environmental concern. By realizing that pro-environmental behavior as a cooperative behavior, collectivists would feel more socially responsible and place more concerns on environmental protection (McCarty & Shrum, 2001).

The findings revealed that older females demonstrated more environmental concern than male, which was consistent with that reported by (Swami et al., 2011). In addition, the relationship between neuroticism and conscientiousness with environmental concern was stronger amongst females. The results were in line with that reported by Hirsh (2010), who has showed that females were more neurotic and conscious on environmental protection.

In conclusion, the current findings have established a significant relationship between personality traits and environmental concern. Most of the environmental protection frameworks/literatures placed limited emphasis on psychological variables such as neuroticism, conscientiousness, agreeableness, openness to experience, extraversion, individualism and collectivism (Barr, 2007). In order to bridge this gap, this study examined the effect of psychological variables on environmental concern to improve the efficiency and quality of these models (for a discussion, see Barr, 2007).

Practical implications

According to the current findings, personality traits should be considered when environmental theories and models are expanded. In order to improve pro-environmental behaviors, individual personality traits should be evaluated (for behavioral modification) before incorporating the information into pro-environmental behavior programs. In addition, behavioral modification program such as psychological training can improve environmental responsibility in the targeted group.

Therefore, it is recommended that psychologists should involve in the planning of pro-environmental behavior strategies.

Limitations and recommendations

This study was characterized by the following limitations. The respondents might overstate their answers in the self-report questionnaires due to social desirability; therefore, future research works should be devoted to measuring behavior via direct observation methods. Moreover, this study was limited to personality traits as the psychological factors. From our opinion, other psychological factors such as cognitive abilities should be considered. This is because personality traits and demographic characteristics are influential on environmental concern. Therefore, spirituality and well-being with environmental concern should be examined in future works. Of course, it might be helpful to improve the efficacy of the existing pro-environmental models. Owing to the fact that this study was the first psychological study investigating the relationships between the Big five personality and the environmental concern (especially agreeableness, openness to experience and extraversion), the current study was largely explanatory and the findings should be replicated.

Lastly, these findings emphasized the importance of personality traits, individualism, and collectivism in environmental concern behaviors.

References

- Barr, S. (2007). Factors influencing environmental attitudes and behaviors a UK case study of household waste management. *Environment and Behavior*, 39(4), 435–473. <http://doi.org/10.1177/0013916505283421>
- Bienvenu, O. J.; Samuels, J. F.; Costa, P. T.; Reti, I. M.; Eaton, W. W., & Nestadt, G. (2004). Anxiety and depressive disorders and the five factor model of personality: A higher and lower order personality trait investigation in a community sample. *Depression and Anxiety*, 20(2), 92–97.
- Boeve-de Pauw, J.; Donche, V., & Van Petegem, P. (2011). Adolescents' environmental worldview and personality: An explorative study. *Journal of Environmental Psychology*, 31(2), 109–117. <http://doi.org/10.1016/j.jenvp.2010.05.003>
- Cho, Y. N.; Thyroff, A.; Rapert, M. I.; Park, S. Y., & Lee, H. J. (2013). To be or not to be green: Exploring individualism and collectivism as antecedents of environmental behavior. *Journal of Business Research*, 66(8), 1052–1059. <http://doi.org/10.1016/j.jbusres.2012.08.020>
- Cho, Y. N.; Thyroff, A.; Rapert, M. I.; Park, S. Y., & Lee, H. J. (2013). To be or not to be green: Exploring individualism and collectivism as antecedents of environmental behavior. *Journal of Business Research*, 66(8), 1052–1059. <http://doi.org/10.1016/j.jbusres.2012.08.020>
- Costa, P. T., & McCrae, R. R. (1989). Neo PI/FFI manual supplement. *Odessa, FL: Psychological Assessment Resources*.
- Davis, J. W. (2008). Handbook of univariate and multivariate data analysis and interpretation with SPSS. *The American Statistician*, 62(3), 268. <http://doi.org/10.1198/000313008X332287>
- Dunlap, R. E., Van Liere, K. D., Mertig, A. G., & Jones, R. E. (2000). New trends in measuring environmental attitudes: measuring endorsement of the new ecological paradigm: a revised NEP scale. *Journal of Social Issues*, 56(3), 425–442. <http://doi.org/10.1111/0022-4537.00176>

- Gudmunson, C. G., & Beutler, I. F. (2012). Relation of parental caring to conspicuous consumption attitudes in adolescents. *Journal of Family and Economic Issues*, 33(4), 389–399.
- Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis: A global perspective (e)* (Vol. 7). Upper Saddle River, NJ: Pearson. Retrieved from <http://digitalcommons.kennesaw.edu/>
- Hirsh, J. B. (2010). Personality and environmental concern. *Journal of Environmental Psychology*, 30(2), 245–248. <http://doi.org/10.1016/j.jenvp.2010.01.004>
- John, O. P., Naumann, L. P., & Soto, C. J. (2008). Paradigm shift to the integrative big five trait taxonomy. *Handbook of Personality: Theory and Research*, 3, 114–158.
- Karbalaeei, S., Abdollahi, A., Abu, M., Nor, S., & Ismail, Z. (2013). Locus of control, problem-solving skills appraisal as predictors of waste prevention behaviors. *Romanian Journal of Applied Psychology*, 15(2), 51–58.
- Karbalaeei, S., Abdollahi, A., Momtaz, V., & Abu Talib, M. (2014). Locus of Control, Neuroticism, and Spirituality as Predictors of Waste-Prevention Behaviors. *Ecopsychology*, 6(4), 252–259. <http://doi.org/10.1089/eco.2014.0038>
- Kieckhafer, K., Wachter, K., & Spengler, T. S. (2016). Analyzing manufacturers' impact on green products' market diffusion—the case of electric vehicles. *Journal of Cleaner Production*.
- Kim, Y., & Choi, S. (2005). Antecedents of green purchase behavior: An examination of collectivism, environmental concern, and PCE. *Advances in Consumer Research*, 32(1), 592–599. Retrieved from: http://www.acrwebsite.org/volumes/v32/acr_vol32_166.pdf
- Kim, Y., & Choi, S. M. (2005). Antecedents of Green Purchase Behaviour: An Examination of Collectivism, Environmental Concern, and PCEE. *Advances in Consumer Research*, 32(1), 592–599. <http://doi.org/10.1177/004057368303900411>
- Kirmani, M. D., & Khan, M. N. (2016). Environmental concern to attitude towards green products: evidences from India. *Serbian Journal of Management*, 11(2).
- Kline, R. B. (2010). *Principles and practice of structural equation modeling*. New York: The Guilford Press. Retrieved from <http://books.google.com.my>
- Kollmuss, A., & Agyeman, J. (2002). Mind the gap: why do people act environmentally and what are the barriers to pro-environmental behavior? *Environmental Education Research*, 8(3), 239–260.
- Lee, K., & Ashton, M. C. (2005). Psychopathy, Machiavellianism, and narcissism in the Five-Factor Model and the HEXACO model of personality structure. *Personality and Individual Differences*, 38(7), 1571–1582.
- MacCann, C., Duckworth, A. L., & Roberts, R. D. (2009). Empirical identification of the major facets of conscientiousness. *Learning and Individual Differences*, 19(4), 451–458.
- McCarty, J. A., & Shrum, L. J. (2001). The influence of individualism, collectivism, and locus of control on environmental beliefs and behavior. *Journal of Public Policy & Marketing*, 20(1), 93–104.
- McCright, A. M., & Xiao, C. (2014). Gender and Environmental Concern: Insights from Recent Work and for Future Research. *Society & Natural Resources*, 27(10), 1109–1113. <http://doi.org/10.1080/08941920.2014.918235>
- Milfont, T. L., & Sibley, C. G. (2012). The big five personality traits and environmental engagement: Associations at the individual and societal level. *Journal of Environmental Psychology*, 32(2), 187–195. <http://doi.org/10.1016/j.jenvp.2011.12.006>
- Newman, T. P., & Fernandes, R. (2015). A re-assessment of factors associated with environmental concern and behavior using the 2010 General Social Survey. *Environmental Education Research*, 4622(October), 1–23. <http://doi.org/10.1080/13504622.2014.999227>
- Ng, S. I., Lee, J. A., & Soutar, G. N. (2007). Tourists' intention to visit a country: The impact of cultural distance. *Tourism Management*, 28(6), 1497–1506. <http://doi.org/http://dx.doi.org/10.1016/j.tourman.2006.11.005>
- Ojedokun, O. (2011). Attitude towards littering as a mediator of the relationship between personality attributes and responsible environmental behavior. *Waste Management*, 31(12), 2601–2611. <http://doi.org/http://dx.doi.org/10.1016/j.wasman.2011.08.014>
- Parizanganeh, A., Lakhani, V. C., Yazdani, M., & Ahmad, S. R. (2011). Modelling categorical data to identify factors influencing concern for the natural environment in Iran. *Journal of Environmental Management*, 92(10), 2836–43. <http://doi.org/10.1016/j.jenvman.2011.06.037>
- Pearman, A., & Storandt, M. (2005). Self-discipline and self-consciousness predict subjective memory in older adults. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences*, 60(3), P153–P157.
- Roberts, B. W., Chernyshenko, O. S., Stark, S., & Goldberg, L. R. (2005). The structure of conscientiousness: An empirical investigation based on seven major personality questionnaires. *Personnel Psychology*, 58(1), 103–139.
- Schmitt, D. P., Realo, A., Allik, J., & Voracek, M. (2008). Why can't a man be more like a woman? Sex differences in Big Five personality traits across 55 cultures. *Journal of Personality and Social Psychology*, 94(1), 168–82. <http://doi.org/10.1037/0022-3514.94.1.168>
- Swami, V., Chamorro-Premuzic, T., Snelgar, R., & Furnham, A. (2011). Personality, individual differences, and demographic antecedents of self-reported household waste management behaviours. *Journal of Environmental Psychology*, 31(1), 21–26. <http://doi.org/http://dx.doi.org/10.1016/j.jenvp.2010.08.001>
- Thieme, J., Royné, M. B., Jha, S., Levy, M., & Barnes McEntee, W. (2015). Factors affecting the relationship between environmental concern and behaviors. *Marketing Intelligence & Planning*, 33(5), 675–690. <http://doi.org/10.1108/MIP-08-2014-0149>
- Triandis, H. C. (1995). *Individualism & collectivism*. Westview Press.
- Triandis, H. C., & Gelfand, M. J. (1998). Converging measurement of horizontal and vertical individualism and collectivism. *Journal of Personality and Social Psychology*, 74(1), 118.
- U.S. Energy Information Administration. (2002). Iran: Environmental Issues Obtained through the Internet. Retrieved from: <http://www.eia.doe.gov/emeu/cabs/iranenv.html>
- Woodcock, C. (2010). *Transformational Leadership and Employee Commitment: The Moderating Role of Perceived Organizational Support and Individual Level Collectivism /Individualism*. Journal of organizational behavior (Vol. 25). Northern Illinois University.
- Zhang, J. W., Howell, R. T., & Iyer, R. (2014). Engagement with natural beauty moderates the positive relation between connectedness with nature and psychological well-being. *Journal of Environmental Psychology*, 38, 55–63. <http://doi.org/10.1016/j.jenvp.2013.12.013>