Pertanika J. Soc. Sci. & Hum. 23 (3): 623 - 638 (2015)

PERTANIKA JOURNALS

SOCIAL SCIENCES & HUMANITIES

Journal homepage: http://www.pertanika.upm.edu.my/

Machiavellianism and Spiritual Intelligence as Predictors of Waste-Prevention Behaviours among Malaysian University Students

Samaneh Karbalaei[1]*, Abbas Abdollahi[2] and Sabrina Abdullah[3]

[1]Faculty of Medicine and Health Science, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[2]Faculty of Human Ecology, Universiti Putra Malaysia, 43400 Serdang, Selangor, Malaysia
[3]Faculty of Environmental Studies, Universiti Putra Malaysia, 43400Serdang, Selangor, Malaysia

ABSTRACT

Understanding the psychological factors related to waste-prevention behaviours of university students could enable local governments and policy makers to craft effective policies to reduce waste. This study utilised a questionnaire-based survey to assess the associations between spiritual intelligence and Machiavellianism as factors that influence waste-prevention behaviours. A total of 210 participants from Universiti Putra Malaysia completed the questionnaires, including the demographic questions, spiritual intelligence inventory, Mach IV, and the waste-prevention behaviours. The data were analysed using Structural Equation Modelling (SEM). The results showed that individuals with higher spiritual intelligence and lower Machiavellianism were more likely to report a positive attitude towards waste-prevention behaviours, and that an inverse association existed between spiritual intelligence and Machiavellianism. Overall, these variables explained 12.0% of the variance in waste-prevention behaviours. Therefore, these findings reinforce the importance of personality traits and cognitive abilities in waste-prevention behaviours.

Keywords: Machiavellianism, spiritual intelligence, waste-prevention behaviours

INTRODUCTION

In a recent decades there has been a dramatic increase in the amount of waste generation as a consequence of rapidly developing economies in developed and developing countries (Barr, 2007; Budhiarta, Siwar, & Basri, 2011; Swami, Chamorro-Premuzic, Snelgar, & Furnham, 2011). Previous studies

ARTICLE INFO

Article history:
Received: 1 October 2013
Accepted: 11 February 2015

E-mail addresses:
samaneh.karbalaei@gmail.com (Samaneh Karbalaei)
abdollahi.abbas58@gmail.com (Abbas Abdollahi)
sabrina@env.upm.edu.my (Sabrina Abdullah)
* Corresponding author

ISSN: 0128-7702

have shown that global municipal solid waste generated in 1997 was approximately 0.49 billion tonnes, and that the annual growth rate was estimated to be 3.2-4.5% in developed countries and 2-3% in developing countries (Johari, Ahmed, Hashim, Alkali, & Ramli, 2012). In Malaysia, for example, increasing waste generation and ineffective waste management have become crucial concerns for the government and the nation. The Ministry of Housing and Local Government estimated that approximately 17,000 tonnes of waste were collected per day in 2002, while only 1-2% of the waste was recycled, with around 80-90% of waste being transferred to landfill and open dumping (Johari *et al*., 2012). On average, the quantity of waste generated per capita is between 0.5 and 0.8 kg/day, while the figure per citizen is about 1.7 kg/day (Budhiarta *et al*., 2011; Johari *et al*., 2012). Given the great amount of waste production in Malaysia, if urgent action is not taken, the amount of waste will rise. Therefore, it is urgent to study waste-prevention behaviours and variables associated with waste-prevention behaviours in order to achieve better outcomes.

The Organisation for Economic Cooperation and Development (OECD, 2000) defined waste-prevention behaviours as people's purchasing behaviours, garbage reduction, strict avoidance and product reuse. All forms of recycling activities and remanufacturing are excluded from this definition. It is noted that prevention means actions undertaken before a material has become waste. According to Tucker and Douglas (2007), waste prevention has several aspects that can be classified into four categories: (a) attitudinal factors (b) contextual factors (c) individual abilities, and (d) habits.

Given the magnitude of waste generation, if urgent action is not taken, it is expected that the quantity of waste will reach around 31,000 tonnes per day by 2020. (Johari *et al*., 2012; Manaf, Samah, & Zukki, 2009). Abd Kadir, Yin, Rosli Sulaiman, Chen and El-Harbawi (2013) reported that 80% of Malaysian waste comprises food, paper and wood. It is widely acknowledged that, although the packaging industry and economic factors affect waste minimisation, the role of the individual in waste prevention is undeniable. Therefore, these figures show that the modern lifestyle and unfavourable habits of Malaysians have increased the quantity of waste in Malaysia. The Malaysian research findings demonstrate that responsible consumption behaviour is an important factor in decreasing waste generation (Loo, 2013).

It is readily acknowledged that personality traits and cognitive abilities play vital roles in waste management programmes – reduction, reuse and recycling behaviours (Swami *et al*., 2011). Accordingly, Oskamp (2000) requests that psychologists develop the role of individual behaviours for conservation of the environment. We have witnessed an increase in psychological research concerning the conservation of the environment. For example, Barr (2007) identifies the situational variables, environmental attitudes and psychological

traits as significant factors in waste-prevention behaviours.

Situational variables are based on individual characteristics (such as socio-demographic factors), structural context, personal experience and habits that affect environmental decision making. Environmental attitude is related to an individual's orientation towards, or concern for, the preservation, restoration or improvement of the environment. Research in this area suggests that individuals with a high openness personality are more likely to pursue environmentally-friendly behaviours (Barr, 2007). Psychological factors are related to the personality traits of the individuals and the role of perception response of those individuals towards waste-prevention behaviours. For instance, previous studies have shown that altruistic individuals are more likely to pursue waste-prevention behaviours and recycling behaviours (Barr, 2007; Bortoleto, Kurisu, & Hanaki, 2012; Hopper & Nielsen, 1991). Furthermore, Ojedokun (2011) shows that altruism and internal locus of control are powerful predictors of environmentally friendly behaviours in a Nigerian sample.

Recently, psychological theorists attempted to describe, characterise and understand the 'pro-environmental individual'. The pro-environmental individual depicts a pattern of environmentally-friendly actions across various domains, such as waste minimisation and energy use (Markowitz, Goldberg, Ashton, & Lee, 2012). Previous studies have found that past behaviours and intentions predict the current or future waste-prevention behaviours (Karbalaei, Abdollahi, Abu, Nor, & Ismail, 2013; Karbalaei, Abdollahi, Momtaz, & Abu Talib, 2014). For example, Swami *et al*. (2011) showed that individuals with low levels of Machiavellianism and high levels of conscientiousness were more likely to pursue better waste management behaviours. In the same vein, Hirsh (2010) found that individuals with high levels of agreeableness and openness were more likely to pursue environmentally-friendly behaviours.

For better or for worse, individual behaviour has a great impact on waste production. Psychological and personality factors may impact on individuals' likelihood to produce pro-environmental behaviours. With personality being such a core part of what motivates our beliefs, values and attitudes, it seems reasonable to expect that basic differences in personality may influence environmental engagement. Therefore, it is clear that awareness of psychological and personality factors helps shape positive waste-prevention behaviours in individuals. However, studies about waste prevention behaviour are extremely limited in Malaysia, and most studies have been conducted in Western countries and the USA. In this study, we aim to investigate the relationships between spiritual intelligence, Machiavellianism and participant's age with waste-prevention behaviours among Malaysian university students at Universiti Putra Malaysia.

RATIONALE FOR CHOOSING STUDIED VARIABLES

Although the available literature has identified a few psychological factors of waste-prevention behaviours, in our opinion, these studies are limited to the limited range of psychological variables that have been investigated. In particular, most research on psychological antecedents with environmentally-friendly behaviours have been done (e.g. self-efficacy, subjective norms, consciousness, openness to experience and egoistic behaviour) using theoretical models, such as those of Markowitz *et al*. (2012) and Barr (2007) concerning waste management behaviours. In our mind, the existing literature on waste prevention behaviour could be expanded through concentrating on the role of personality traits and cognitive abilities that emphasise consistency in environmental attitudes. Another rationale for this choice is that spiritual intelligence and Machiavellianism assist behavioural modification to contribute better waste-prevention behaviours.

These ideas have not been tested in Malaysia, and such findings contribute to deeper understanding of waste-prevention behaviours that enable decision makers to design efficient waste-prevention programmes. Therefore, this research attempts to investigate this void in the literature by focusing on spiritual intelligence and Machiavellianism as predictors of waste-prevention behaviours. It is clear that the effect of the psychological variables on waste-prevention behaviours is not comprehensive; however, these variables assist in increasing our understanding of personality traits and cognitive ability in the development of waste-prevention behaviours. The reasons for choosing the variables are briefly explained below.

First, we examine the association between waste prevention behaviour and Machiavellianism. Christie, Geis and Berger (1970) defined Machiavellianism as a personality trait in which an individual shows negative intentions to others and is self-serving, and it can be observed as an excessive type of egoistic concern. Individuals with high levels of Machiavellian traits are more likely to show interpersonal strategies such as lying, flattery, guile and deceit, and these individuals ascribe negative intentions to others and begin with the expectation that they must exploit others or be exploited themselves. In this sense, Machiavellianism can be reflected as an excessive form of egoistic concern, and Machiavellian individuals show decreased awareness for the emotional state of others. Research findings have shown that Machiavellian individuals do not tend to pursue environmentally-friendly behaviours (Swami, Chamorro-premuzic, Snelgar, & Furnham, 2010). It seems plausible that Machiavellianism would be negatively associated with waste-prevention behaviours.

Second, we examined the association between waste prevention behaviour and spiritual intelligence (SQ). In recent years, spirituality has been investigated as a major feature of human beings that has a substantial

association with health improvement (Faribors, Fatemeh, & Hamidreza, 2010). Previous studies suggest that spirituality is considered as a form of intelligence (Hyde, 2004). Spiritual intelligence is defined as the intelligence of conscience, moral intelligence and the inherent ability to identify right from wrong (Zohar, 2012). Indeed, it is the intelligence through which longing, ability to solve problems of meaning and the role of beliefs, values, goodness and truth in our life-path are developed (Zohar, 2012). Other characteristics associated with 'spiritual intelligence' include extroversion, agreeableness and conscientiousness (Kamitsis & Francis, 2013). One previous research showed that conscientiousness and agreeableness personalities were more likely to pursue waste management behaviours i.e. reduction, reuse, recycling (Swami *et al*., 2011). A study found that a sense of spirituality was significantly associated with connectedness to nature (Kamitsis & Francis, 2013). According to the definition of spiritual intelligence and what the literature shows, it seems plausible that spiritual intelligence is positively associated with waste-prevention behaviours.

The current study intends to examine a number of hypotheses: (1) Machiavellianism is negatively associated with waste-prevention behaviours; (2) spiritual intelligence is positively associated with waste-prevention behaviours.

MATERIALS AND METHODS

Selangor state has the largest percentage of waste, which is estimated to be 3,923 tons per day (Saheri, Mir, & Basri, 2012), and recent studies have shown that the amount of waste considerably increased with the rise in number of students in universities (Chibunna, Siwar, Begum, & Mohamed, 2012; Desa, Kadir, & Yusooff, 2012). In a developing country, a schooled individual such as a university student is considered knowledgeable, and his/her attitude in family matters is valued high. Additionally, adult university students are part of the population and their role in waste production and prevention needs to be understood. Based on earlier reasons, this study recruited university students from Universiti Putra Malaysia (Selangor) to conduct the current study.

Participants

Participants in this study comprised 210 students (male=45.2, %, and female=54.8, aged from 19 to 38 years old, Mean=27.43, SD=4.78) from Universiti Putra Malaysia. In terms of ethnicity, participants consisted of Malay (44.8%), Chinese (21.0%), Indian (22.4%) and others (11.9%). The educational levels of students included 70.9%, n=149 bachelor's degree, 15.7%, n=33 master's degree and 13.4%, n=28 PhD. In addition, in terms of marital status, 71% were single and 29% were married. The majority of participants in this study had no income (76.3%).

Procedure

The questionnaires were distributed and collected from February to April 2013. Permission from the Graduate Students Office of Universiti Putra Malaysia was obtained for collecting data from students, and the Universiti Putra Malaysia ethics committee approved the study. Firstly, 16 faculties at Universiti Putra Malaysia were categorised into three fields (science, social sciences and engineering). Secondly, two faculties were chosen random from each field, and one class from each faculty was randomly selected. Lastly, the packages of questionnaires were distributed among students during regular class hours. The package of questionnaires included an introductory letter and four questionnaires including demographic questionnaire, spiritual intelligence inventory, Machiavellianism and waste prevention behaviour questionnaires. A total of 250 copies of the questionnaire were distributed by hand, of which 210 (84%) usable ones were returned.

MEASURES

The Spiritual Intelligence Self-Report Inventory

This inventory is a 24-item (King, 2008) that measures four factors of spiritual intelligence: (a) Critical Existential Thinking (CET), which is defined as metaphysical issues like thinking about the nature of living, the universe, space, time and death, with 7 items in total; (b) Personal Meaning Production (PMP), which is defined as the capacity to acquire personal meaning and purpose from all physical and psychological experiences, with 5 items in total; (c) Transcendental Awareness (TA), which is defined as the ability to recognise "transcendent dimensions of the self, of others, and of the physical world " in the normal and conscious state, and is associated with the ability to recognise their "relationship to one's self and to the physical world ", with 7 items in total; and (d) Conscious State Expansion (CSE), which is defined as the capacity to "enter and exit higher/spiritual states of consciousness (e.g. unity and oneness)" through one's own insight (e.g. deep thinking), with 5 items in total (Arbabisarjou, Raghib, Moayed, & Rezazadeh, 2013). The sum of the four factors is spiritual intelligence. The total score is from 0 to 96 and all questions use a 4-point Likert scale. Several studies have revealed that this questionnaire has a powerful convergent and divergent validity (Amrai, Farahani, Ebrahimi, & Bagherian, 2011; Arbabisarjou *et al*., 2013). In the present study, the convergent validity (Average Variance Extracted) was 0.5, and the construct reliability (CR) was 0.71.

Mach IV

This 20-item MACH-IV scale (Christie *et al*., 1970) assesses the tendency of individuals to use informal power (e.g. interpersonal 'tactics', cynical attitude to human nature and negligence towards conventional morality) to control others (O'Connor & Athota, 2013). The total score is from 20 to 100, and all questions use a 5-point Likert scale. A higher score indicates

a higher Machiavellian trait and vice versa. Several studies have revealed that the Mach-IV scale has a powerful convergent and divergent validity (Ali & Chamorro-Premuzic, 2010; O'Connor & Athota, 2013; Swami *et al*., 2011) and concurrent validity (Rauthmann, 2013). In the present study, the convergent validity (Average Variance Extracted) was 0.81, and the construct reliability (CR) was 0.98.

Waste-Prevention Behaviours

This questionnaire (Kurisu & Bortoleto, 2011) comprises 18 items that measure waste prevention behaviour. The total score is from 18 to 90, and all items are rated using a 5-point Likert scale. Higher scores indicate greater waste prevention behaviour and vice versa. The items in the waste prevention behaviour scale consisted of (a) shopping habits, for example, using suitable bags for carrying products instead of plastic bags, buying products with less packaging, using personal cup, spoon and repair items before purchasing new products; (b) buying reusable products, packages, dishcloths, refillable products, returnable bottles; (c) using recycling shops for recyclable products and composting food waste; and (d) refusing to buy needless products, packages and bottled drinking water (Kurisu & Bortoleto, 2011). In the present study, the convergent validity (Average Variance Extracted) was 0.85, and the construct reliability (CR) was 0.97.

Demographics

A self-report questionnaire was provided to obtain demographic information, such as age (ratio scale was used to measure age), gender, religion, race, education, marital status (nominal scale was used to measure them), and income (interval scale was used to measure income).

ANALYSIS

In the current research, Structural Equation Modelling (SEM) was applied to estimate the utility of spiritual intelligence, Machiavellianism (latent variables) and age (observed variable) as predictors of waste prevention behaviour. To date, most studies on relationships between psychological factors and environmental issues have employed hierarchical multiple regression analyses (Arnocky, Stroink, & DeCicco, 2007; Givens & Jorgenson, 2013). Kline (2011) highlighted a few characteristics that set SEM apart from older generations of multivariate procedures. Firstly, SEM is a technique that analyses the relationships between endogenous and exogenous variables according to the hypotheses of the study. Secondly, unlike traditional multivariate analyses that ignore errors, SEM estimates errors of variance parameters. Thirdly, Structural Equation Modelling (SEM) makes it possible for researchers to estimate relations among constructs that are corrected for bias attributable to random error and construct-irrelevant variance by providing separate estimates of relations among latent constructs and their manifest indicators (Tomarken & Waller, 2005).

Given these advantages over conventional data analysing techniques, SEM is suitable for analysing the data for the current study (Kline, 2011).

The analysis showed that the data were normal because the skewedness values were from (-1.08 to 1.23) and the kurtosis values were from (-1.59 to 0.94) for all variables. Missing data for parcels and items (range from .67% to 2.86%) were addressed with the series' mean method in SPSS software. Byrne (2009) stated that if the skewedness value is between -2 and +2 and the kurtosis value is between -7 and +7, the data is considered to be normal. For acceptable model fit, the goodness of fit indices, such as the chi square/degree of freedom ratio (CMIN/DF), the comparative-fit index (CFI), the goodness-of-fit index (GFI) and the Tucker-Lewis Index (TLI) are equal or greater than 0.90, and the root mean squared error of approximation (RMSEA) is between 0.03 and 0.08 (Byrne, 2009). In addition, the group value SEM was used for comparison between the male and female groups. In this research the AMOS 20 software was applied for analysing the data.

RESULTS

Descriptive Statistic

As can be seen from Table 1, means, standard deviations, actual range and possible range are reported.

Structural Equation Model

The model includes spiritual intelligence, Machiavellianism, and age as exogenous variables, and waste-prevention behaviours as an endogenous variable that provided an acceptable fit for the data (CMIN/DF=1.43, $p<.01$, CFI=.983, GFI=.90, TLI=.978, RMSEA=.045). Figure 1 indicates that age had no significant effect on waste-prevention behaviours while spiritual intelligence and Machiavellianism had a significant effect on waste-prevention behaviours. As can be seen in Fig.1, greater spiritual intelligence and lower Machiavellianism were associated with better waste-prevention behaviours. These variables explained 12.0% of the variance in waste-prevention behaviours. In addition, an inverse association existed between spiritual intelligence and Machiavellianism.

Standardised factor loadings of each items are presented in Table 2.

TABLE 1
Means, Standard Deviation, Actual and Possible Range of Study Variables

Variables	Spiritual intelligence	Machiavellianism	WPB	Age
Mean	54.91	36.43	60.24	27.43
Standard Deviation	11.28	8.99	16.26	4.78
Actual range	32-67	20-56	22-86	19-38
Possible range	0-96	20-100	18-90	-

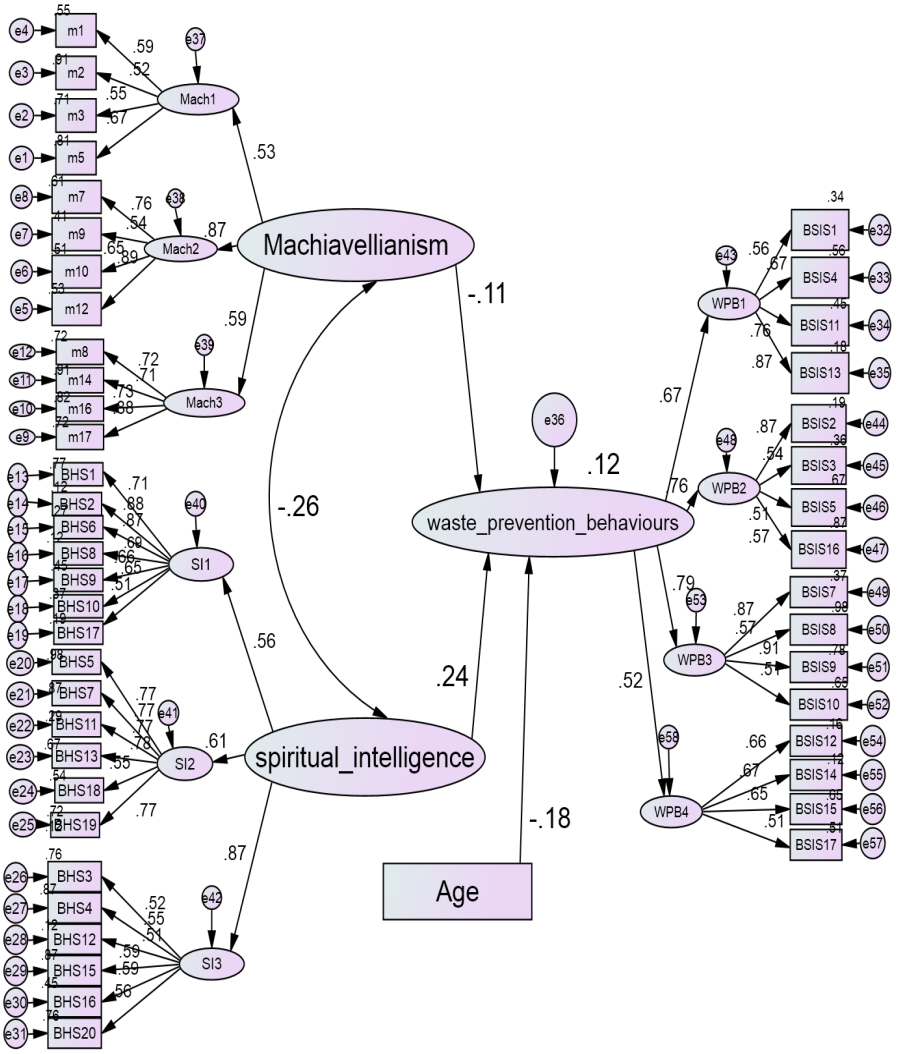

Fig.1: Structural model for the waste-prevention behaviours.

Note: all pathways were significant with $p < 0.01$, except age

Moderation Test of Gender

The first step to test the moderation effect is to compare the 'unconstrained model' against 'the measurement residuals model'. If the 'unconstrained model' is better than 'the measurement residuals model', then we can conclude that there is a moderation effect of moderating variables on the overall model. The second step to test the moderation effect is to check for the significance of individual paths. The path is moderated by moderator if: (1) the beta for a group is significant while the beta for other groups is not significant; (2) the beta for all groups is significant but one is positive and the other, negative (Hair, Black, Babin, Anderson, & Tatham, 2006).

The comparison between the 'unconstrained model' and the 'measurement residuals model' showed that the unconstrained model with ($\Delta \chi 2$ (4020.38), DF=542, $p< 0.01$) and the measurement residuals model with ($\Delta \chi 2$ (4258.21) , DF=594, $p< 0.01$) were significant; however, the unconstrained model was better than the measurement residuals model because the chi-square was smaller (Hair *et al*., 2006). According to the measurement residuals model (χ^2=237.83, dF=52, and $p<0.05$) in "the assuming model unconstrained to be correct", the results indicate that the impact of likely differences across gender was significant.

Table 3 shows that the relationship between spiritual intelligence and waste prevention behaviour for female students is significant (β=0.273) while the path hypothesis for male students is not significant (β=0.195). Therefore, the moderating effect of gender on this path is supported,

TABLE 2
Standardised Factor Loadings of Each Item

Items	SFL[1]	Items	SFL[1]	Items	SFL[1]	Items	SFL[1]
Mach1	.53	SI1	.56	SI3	.87	BSIS5	.51
m1	.59	BHS1	.71	BHS3	.52	BSIS6	.57
m2	.52	BHS2	.88	BHS4	.55	WPB3	.79
m3	.55	BHS6	.87	BHS12	.51	BSIS7	.87
m5	.67	BHS8	.69	BHS15	.59	BSIS8	.57
Mach2	.87	BHS9	.66	BHS16	.59	BSIS9	.91
m7	.76	BHS10	.65	BHS20	.56	BSIS10	.51
m9	.54	BHS17	.51	WPB1	.67	WPB4	.52
m10	.65	SI2	.61	BSIS1	.56	BSIS12	.66
m12	.89	BHS5	.77	BSIS4	.67	BSIS14	.67
Mach3	.59	BHS7	.77	BSIS11	.76	BSIS15	.65
m8	.72	BHS11	.77	BSIS13	.87	BSIS17	.51
m14	.71	BHS13	.78	WPB2	.76		
m16	.73	BHS18	.55	BSIS2	.87		
m17	.88	BHS19	.77	BSIS3	.54		

Note: 1=SFL: Standardised factor loading

meaning that greater spiritual intelligence predicted a higher likelihood of waste prevention for females but not for males. In addition, the results revealed that there was no significant relationship between Machiavellianism and waste prevention behaviour for female students (β=-0.061) while the path hypothesis for male students is significant (β=-0.281). Therefore, the moderating effect of gender on the path relationship between Machiavellianism and waste prevention behaviour is supported, meaning that greater Machiavellianism predicated a lower likelihood of waste-prevention behaviours for males but not for females.

DISCUSSION

We believe that the relationships between spiritual intelligence, Machiavellianism and waste-prevention behaviours can improve theoretical developments in attitude towards environment. There is a point worth noting before we discuss the key findings. Spiritual intelligence and Machiavellianism explained 12.0% of the variance in waste-prevention behaviours, signifying that other variables not considered for this study (e.g. values, norms, identity issues and situational factors) are also valuable in clarifying the attitude towards waste-prevention behaviours.

Findings indicate that spiritual intelligence was positively associated with a positive attitude towards waste-prevention behaviors among university students. One explanation for this result is that individuals high in spiritual intelligence carefully pursue social guidelines and norms for acceptable environmental actions (Kamitsis & Francis, 2013). Several studies have indicated that spiritual intelligence is linked to attributes such as intellectualism, morality, self-disciplined, organised and an inclination to act according to the principles of conscience (Bienvenu *et al*., 2004; John, Naumann, & Soto, 2008; Pearman & Storandt, 2005). Waste-prevention behaviours is an ethical and moral behaviour that helps in human well-being, and individuals high in spiritual intelligence are more likely to respect the human and societal rights as well as follow social rules and norms for suitable environmental action (Milfont & Sibley, 2012). Therefore, spiritual individuals are more motivated to engage in friendly environmentally behaviours (Kamitsis & Francis, 2013).

Another significant point to note is that Machiavellianism was negatively associated

TABLE 3
Standardised Regression Weights (Gender Variant Model)

Hypothesis			Male			Female		
			S.E.[1]	C.R.[2]	SE[3]	S.E.[1]	C.R.[2]	SE[3]
WPB[4]	<---	Spiritual Intelligence	1.412	1.045	.195	1.388	1.499	.273**
WPB	<---	Machiavellianism	0.888	-0.611	-.281**	-1.174	-1.012	-.061

Note: **P <.05, without*= Not significant. 1: Standard Error, 2: Critical Ratio, 3: Standard Estimate, and 4: Waste Prevention Behaviour

with waste-prevention behaviours. Previous studies have shown that Machiavellianism is associated with attributes such as extreme egoistic concern, self-serving and deceit (Geis & Moon, 1981; Swami *et al*., 2010, 2011), low biospheric and low altruistic (Swami *et al*., 2011). To some extent, waste-prevention behaviours require optimism, altruism, empathy, conscientiousness, good judgment and social responsibility (Corbett, 2005; Swami *et al*., 2011). Therefore, lower Machiavellianism is associated with better waste-prevention behaviours. The findings are consistent with previous studies that found that men were more Machiavellian than women (Andreou, 2004).

Generally, the findings of the current study emphasised the importance of personality traits and cognitive ability when examining waste-prevention behaviour. It is important to note that most conceptual frameworks of environmental behaviour have less consideration for personality traits and cognitive abilities in their models. For example, Barr's (2007) conceptual framework contains some psychological factors such as intrinsic motivation and subjective norms; however, psychological factors such as personality traits and cognitive abilities in this theory are not considered. The inclusion of psychological variables in the environmentally-friendly behaviour models could improve the efficiency of these models.

CONCLUSION

To conclude, the concentration on characteristics of people in predicting waste-prevention behaviours is noteworthy, as in our opinion waste prevention needs intervention at numerous levels to be effectively addressed. Theoretical models of the behaviour of people as individuals and the behaviour of aggregate individuals are necessary if we are to attempt to change the behaviour of both individuals and groups of individuals. To maximise change-specific behaviour and attitudes, the network of more general behavioural tendencies in which the specific behaviours of interest are embedded needs to be understood. This is important because different appeals may work for different people or for citizens within nations, depending upon differences in personality. By documenting how stable regularities in overall behavioural tendencies (i.e., personality) are related to more specific environmental attitudes and behaviour, we hope to provide important baseline information that may be useful in the ongoing collaborative effort to build models of the psychology underpinning.

The results highlight the role of spirituality in reducing Machiavellianism and improving waste-prevention behaviours. One important limitation of this study is its reliance on self-report questionnaires. Although the measures used in the study are psychometrically adequate, a multi-method approach would be superior and would lend incremental validity to the current study. Studies have shown that when participants completed questionnaires of mental health and spirituality simultaneously, they may tend to overlap perceptions of mental health with spiritual well-being. Consequently,

it is plausible that clinical interviewing, peer-report and direct observation methods might enable us to overcome the mentioned limitation. Future research could examine other psychological traits and cognitive abilities with waste-prevention behaviours. This is because personality traits and demographic characteristics have a significant influence on waste-prevention behaviours. For instance, future research could examine antisocial personality and emotional intelligence with waste-prevention behaviours. Of course, it might be beneficial to expand on the environmentally-friendly models that exist in the environmental literature.

REFERENCES

Abd Kadir, S. A. S., Yin, C.-Y., Rosli Sulaiman, M., Chen, X., & El-Harbawi, M. (2013). Incineration of municipal solid waste in Malaysia: Salient issues, policies and waste-to-energy initiatives. *Renewable and Sustainable Energy Reviews, 24*, 181–186. doi: http://dx.doi.org/10.1016/j.rser.2013.03.041

Ali, F., & Chamorro-Premuzic, T. (2010). Investigating theory of mind deficits in nonclinical psychopathy and Machiavellianism. *Personality and Individual Differences, 49*(3), 169–174. doi: http://dx.doi.org/10.1016/j.paid.2010.03.027,

Amrai, K., Farahani, A., Ebrahimi, M., & Bagherian, V. (2011). Relationship between personality traits and spiritual intelligence among university students. *Procedia-Social and Behavioral Sciences, 15*, 609–612. doi: http://dx.doi.org/10.1016/j.sbspro.2011.03.149

Andreou, E. (2004). Bully/victim problems and their association with Machiavellianism and self-efficacy in Greek primary school children. *British Journal of Educational Psychology, 74*(2), 297–309. doi: 10.1348/000709904773839897

Arbabisarjou, A., Raghib, M.-S., Moayed, N., & Rezazadeh, S.-S. (2013). Relationship between different types of intelligence and student achievement. *Life Science Journal, 10*(7).

Arnocky, S., Stroink, M., & DeCicco, T. (2007). Self-construal predicts environmental concern, cooperation, and conservation. *Journal of Environmental Psychology*, *27*(4), 255–264.

Barr, S. (2007). Factors influencing environmental attitudes and behaviors: A UK case study of household waste management. *Environment and Behavior, 39*(4), 435–473. doi: 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.

Bortoleto, A. P., Kurisu, K. H., & Hanaki, K. (2012). Model development for household waste prevention behaviour. *Waste Management, 32*(12), 2195–2207. doi: http://dx.doi.org/10.1016/j.wasman.2012.05.037,

Budhiarta, I., Siwar, C., & Basri, H. (2011). Current status of municipal solid waste generation in Malaysia. *International Journal on Advanced Science, Engineering and Information Technology, 2*(2), 16–21.

Byrne, B. M. (2009). *Structural equation modeling with AMOS: Basic concepts, applications, and programming*: CRC Press.

Chibunna, J. B., Siwar, C., Begum, R. A., & Mohamed, A. F. (2012). The challenges of e-waste management among institutions: A case study of UKM. *Procedia - Social and Behavioral Sciences*, *59*, 644–649. doi:10.1016/j.sbspro.2012.09.325

Christie, R., Geis, F. L., & Berger, D. (1970). *Studies in machiavellianism*: Academic Press New York.

Corbett, J. B. (2005). Altruism, self-interest, and the reasonable person model of environmentally responsible behavior. *Science Communication, 26*(4), 368–389. doi: 10.1177/1075547005275425

Davis, J. W. (2008). Handbook of univariate and multivariate data analysis and interpretation with SPSS. *The American Statistician, 62*(3). doi: 10.1198/000313008X332287

Desa, A., Kadir, N. B. A., & Yusooff, F. (2012). Waste education and awareness strategy: Towards solid waste management (SWM) Programme at UKM. *Procedia - Social and Behavioral Sciences*, *59*, 47–50. doi:10.1016/j.sbspro.2012.09.244

Faribors, B., Fatemeh, A., & Hamidreza, H. (2010). The relationship between nurses' spiritual intelligence and happiness in Iran. *Procedia-Social and Behavioral Sciences, 5*, 1556–1561. doi: http://dx.doi.org/10.1016/j.sbspro.2010.07.325,

Geis, F. L., & Moon, T. H. (1981). Machiavellianism and deception. *Journal of Personality and Social Psychology, 41*(4), 766-775. doi: 10.1037/0022-3514.41.4.766

Givens, J. E., & Jorgenson, A. K. (2013). Individual environmental concern in the world polity: A multilevel analysis. *Social Science Research*, *42*(2), 418–431.

Hair, J. F., Black, W. C., Babin, B. J., Anderson, R. E., & Tatham, R. L. (2006). *Multivariate data analysis: A global perspective (c)* (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. doi: http://dx.doi.org/10.1016/j.jenvp.2010.01.004

Hopper, J. R., & Nielsen, J. M. (1991). Recycling as altruistic behavior normative and behavioral strategies to expand participation in a community recycling program. *Environment and behavior, 23*(2), 195–220. doi: 10.1177/0013916591232004

Hyde, B. (2004). The plausibility of spiritual intelligence: Spiritual experience, problem solving and neural sites. *International Journal of Children's Spirituality, 9*(1), 39–52. doi: 10.1080/1364436042000200816

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.

Johari, A., Ahmed, S. I., Hashim, H., Alkali, H., & Ramli, M. (2012). Economic and environmental benefits of landfill gas from municipal solid waste in Malaysia. *Renewable and Sustainable Energy Reviews, 16*(5), 2907–2912. doi: http://dx.doi.org/10.1016/j.rser.2012.02.005

Kamitsis, I., & Francis, A. J. P. (2013). Spirituality mediates the relationship between engagement with nature and psychological wellbeing. Journal of Environmental Psychology, 36, 136–143. doi:http://dx.doi.org/10.1016/j.jenvp.2013.07.013

Karbalaei, 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.

Karbalaei, 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. doi:10.1089/eco.2014.0038

King, D. B. (2008). *Rethinking claims of spiritual intelligence: A definition, model, and measure*: Trent University (Canada).

Kline, R. B. (2011). *Principles and practice of structural equation modeling*: Guilford press.

Kurisu, K. H., & Bortoleto, A. P. (2011). Comparison of waste prevention behaviors among three Japanese megacity regions in the context of local measures and socio-demographics. *Waste Management, 31*(7), 1441–1449. doi: http://dx.doi.org/10.1016/j.wasman.2011.03.008

Loo, W. H. Y., Paul H.P.; and Eze, Uchenna Cyril. (2013). Responsible consumption behaviour: A framework for use & disposal of computers. *PACIS Proceedings. Paper 278.http://aisel.aisnet.org/pacis2013/278*.

Manaf, L. A., Samah, M. A. A., & Zukki, N. I. M. (2009). Municipal solid waste management in Malaysia: Practices and challenges. *Waste Management, 29*(11), 2902-2906. doi: http://dx.doi.org/10.1016/j.wasman.2008.07.015

Markowitz, E. M., Goldberg, L. R., Ashton, M. C., & Lee, K. (2012). Profiling the "pro□environmental individual": A personality perspective. *Journal of personality, 80*(1), 81-111. doi: 10.1111/j.1467-6494.2011.00721.x

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. doi:10.1016/j.jenvp.2011.12.006

O'Connor, P. J., & Athota, V. S. (2013). The intervening role of agreeableness in the relationship between trait emotional intelligence and machiavellianism: Reassessing the potential dark side of EI. *Personality and Individual Differences*(0). doi: http://dx.doi.org/10.1016/j.paid.2013.06.006

OECD. (2000). The Organisation for Economic Co-operation and Development, 2000. Reference Manual on Strategic Waste Prevention, ENV/EPOC/PPC 5/ FINAL. OECD, Paris.

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. doi: http://dx.doi.org/10.1016/j.wasman.2011.08.014

Oskamp, S. (2000). A sustainable future for humanity? How can psychology help? *American Psychologist, 55*(5), 496. doi: 10.1037/0003-066X.55.5.496

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.

Rauthmann, J. F. (2013). Investigating the MACH–IV with item response theory and proposing the trimmed MACH*. *Journal of Personality Assessment* (ahead-of-print). doi: 10.1080/00223891.2012.742905

Saheri, S., Mir, M., & Basri, N. (2012). Life cycle assessment for solid waste disposal options in Malaysia. Polish Journal of …, 21(5), 1377–1382. Retrieved from http://www.pjoes.com/pdf/21.5/pol.j.environ.stud.vol.21.no.5.1377-1382.pdf

Swami, V., Chamorro-Premuzic, T., Snelgar, R., & Furnham, A. (2010). Egoistic, altruistic, and biospheric environmental concerns: A path analytic investigation of their determinants. *Scandinavian Journal of Psychology, 51*(2), 139–145. doi: 10.1111/j.1467-9450.2009.00760.x

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. doi: http://dx.doi.org/10.1016/j.jenvp.2010.08.001

Tomarken, A. J., & Waller, N. G. (2005). Structural equation modeling: Strengths, limitations, and misconceptions. *Annu. Rev. Clin. Psychol., 1*, 31–65. doi: 10.1146/annurev.clinpsy.1.102803.144239

Tucker, P., & Douglas, P. (2007). Understanding household waste prevention behaviour. Technical report no. 3: Conceptual and Operational model of household waste prevention behaviour. Defra, WR0112. <http://randd.defra. org.uk>.

Zohar, D. (2012). *Spiritual intelligence: The ultimate intelligence.* Bloomsbury Publishing.