Legal and Criminological Psychology (2014), 19, 80–103

The British Psychological Society

www.wileyonlinelibrary.com

Why ordinary people comply with environmental laws: A structural model on normative and attitudinal determinants of illegal anti-ecological behaviour

Ana M. Martín[1]*, Bernardo Hernández[1], Martha Frías-Armenta[2] and Stephany Hess[1]

[1]Universidad de La Laguna, Spain
[2]Universidad de Sonora, Mexico

Purpose. The aim of this study is to propose and test a comprehensive model of compliance with environmental law (EL). The legal and psychosocial peculiarities of environmental transgressions suggest that the nature and relative impact of the determinants of ordinary people's compliance with EL may differ from those involved in compliance with ordinary laws.

Method. A total of 439 university students of Law, Psychology, Pedagogy, and Speech Therapy majors, aged between 18 and 58, took part in the study. Participants answered a questionnaire assessing illegal anti-ecological behaviour (IAEB), legal-sanction-related variables, injunctive and prescriptive social norms, personal norms, and sustainability attitudes. The data from all participants were processed using structural equation analysis to test the hypothesized model.

Results. The main antecedents of IAEB are personal norms and, to a lesser extent, sustainability attitudes and descriptive social norms. Personal norms on IAEB are influenced by injunctive social norms and also by sustainability attitudes. Legal-sanction-related variables affect personal norms and IAEB, but only by indirectly influencing social norms.

Conclusions. Although legal-sanction-related variables and norms have been traditionally used to explain illegal behaviour, the legal and psychosocial peculiarities of IAEB are reflected in the process of compliance with environmental protection laws. Results allow for a refinement of the relationship between personal and social norms, showing that the main determinants of IAEB is personal norm, but that descriptive social norms also directly affect behaviour, and that sustainability attitudes play an unquestionable role in compliance with ELs.

*Correspondence should be addressed to Ana M. Martin, Dpto. Psicología Social, Universidad de La Laguna, 38205-La Laguna, Spain (e-mail: ammartin@ull.es).

DOI:10.1111/j.2044-8333.2012.02062.x

Breaches of environmental laws (ELs) are a peculiar form of illegal behaviour from both a legal and a psychosocial point of view. From a legal perspective, the peculiarities of environmental transgressions (ETs) are reflected in three features. First, EL is a fragmented and difficult-to-coordinate field, which involves administrative, civil, and criminal regulations, enforced at federal, state, and local levels (Parejo-Alfonso, 2008; Situ & Emmons, 2000; Tompkins, 2005). Breaches of ELs are not always crimes in the strict legal sense, although they very often entail substantial fines. Second, most people have difficulty in distinguishing legal from illegal anti-ecological behaviours (IAEBs), partly because many anti-ecological behaviours become illegal only when they exceed the limits established by law or when a specific license to carry out an action has not been obtained (Korsell, 2001). Third, neither is it easy to determine when an IAEB is an offence or an administrative infraction because the criterion to differentiate between them is usually like 'the degree to which [a specific behavior] seriously harms the balance of the natural systems' (Art. 325, Spanish Criminal Code).

From a psychosocial point of view, breaches of ELs also constitute a peculiar form of illegal behaviour as their 'wrongness' is not always obvious. They harm both the environment and human beings but they are not universally perceived as illegal, or even reproachable (Korsell, 2001; Martín, Hernández *et al.*, 2008). This lack of social reproach may be related to the characteristics of the consequences, sanctions, victims, and perpetrators.

The consequences of ETs are not always immediate or evident. In many cases, as the incident often occurs for the first time, there is no precedent that enables evaluations of the actual situation and predictions of short- and long-term effects. Furthermore, even experts disagree in their evaluation of the harm done, depending on whether they are involved with the interests of the parties. This situation is worse when the punishable effect is not the harm itself but the risk of such harm (Mårald, 2001).

The very severe penalties that do exist for ETs are seldom imposed (Korsell 2001; Watson, 2005). This could be because ELs have generally been drawn up in response to catastrophes, which are uncommon (Mårald, 2001). The extremity of these events raises the thresholds for specific behaviours to be considered punishable, and leads to the underestimation of the risks of future occurrence and the need for subsequent surveillance. Thus, although sanctions associated with ecological damage are severe, the frequency with which the accused is found guilty is very low, making legal precedents scarce. Accordingly, prison sentences are very rare, and fines are the most commonly imposed sentence (Korsell, 2001; Martin, Salazar-Laplace *et al.*, 2008; Watson, 2005). Lastly, sometimes fines are minor investments for companies, compared to the routine cost of doing business legally, making ETs economically profitable (Wilson, 1986).

The victims of ETs are not specific individuals but often a large, indeterminate group of people affected in the short or long term. In some cases, the victims can be the present and future populations of an entire region. However, as nobody feels individually compelled to report the incident, initiating a legal process against the suspects falls almost exclusively to administrations (Martin, Salazar-Laplace *et al.*, 2008).

The profile of the environmental transgressor also contributes to the peculiarity of ETs since they are often committed by people who are 'radically different from ordinary criminals' (Mårald, 2001, p. 158), no matter whether the transgressor is a corporation, the military, the government, or a private individual (Situ, 1998). Most ETs handled by the administrations across jurisdictions are committed mainly by individuals in the course of their personal activities regarding home care, leisure or, to a lesser extent, while at work in small local businesses (Martin, Salazar-Laplace *et al.*, 2008).

The aim of this study is to propose and test a comprehensive model of compliance with ELs. Previous research shows that people consider IAEBs to be generally wrong and that they reveal the badness of those who behave in such a way. That said circumstances may lead individuals who are not really bad to behave illegally in environmental terms (Alonso, Martín, Hess, & Ruiz, 2011; Martin, Hernández *et al.*, 2008). Therefore, ELs appear to have social support and be consolidated as social and personal norms, although most of them are of recent creation (Mårald, 2001). However, environmental transgressors' accounts for their misconducts suggest that the link between the accused and the law broken is weak (Martin, Salazar-Laplace *et al.*, 2008; Martín, Salazar-Laplace, & Ruiz, 2008; Situ, 1998). This lack of attachment to the law may be because their accounts (written statements submitted in response to the administration's action against them) are used to avoid sanctions (Itoi, Ohbuchi, & Fukuno, 1996). Yet, as these are not ordinary offenders, the excuses and justification that they choose from those available may also reveal the factors that ordinary people consider important when assigning punishment and feelings of guilt for committing ETs (Walton, 1985).

Therefore, the model proposed predicts IAEB by combining sustainability attitudes with legal-sanction-related variables and social and personal norms. Sustainability attitudes are pertinent for the model because they have been associated with environmentally relevant behaviour (e.g., Mobley, Vagias, & DeWard, 2010; Nigbur, Lyons, & Uzzell, 2010). Legal-sanction-related variables and social and personal norms are traditionally used to explain illegal behaviour. However, the peculiarities of ET are expected to be reflected in the nature and strength of the links between these variables, as occurs with tax-related offences (Wenzel, 2004a, 2004b). These variables were chosen on the basis of the empirically supported knowledge derived from three classical theoretical frameworks, which have been used to understand behaviour motivated by punishment and normative behaviour. These frameworks embrace the deterrence theory, the focus theory of normative conduct, and the moral norm-activation theory, and are summarized in the following sections, preceding the description of the model on compliance with IAEB, which is tested in the empirical section of the paper.

Deterrence theory on illegal behaviour

Deterrence theory is an instrumental approach, originally developed to explain criminal behaviour, which has informed criminal justice policies at several levels. The roots of deterrence theory are in Beccaria's (1738–1794) and Bentham's (1748–1832) writings, although the theory has been reformulated many times as rational-choice or economic models of crime (Paternoster, 2010). Deterrence theory states that individuals consider the net utility of being involved in illegal behaviour, by weighing the gains against the perceived certainty, severity, and swiftness of legal sanctions (Polinsky & Shavell, 2000). Empirical evidence supports the finding that there is a moderate negative correlation between perceived certainty and severity of sanctions, and self-reported criminal behaviour for diverse offences. However, there are doubts about whether this association may be more complex than originally formulated (Paternoster, 1987, 2010). In psychology, deterrence principles have been approached by behavioural psychologists in terms of the law of effect (Skinner, 1938; Thorndike, 1911), generating a large body of research on how punishment affects human behaviour (Church, 1963), including criminal behaviour (McGuire, 2002). Most are laboratory studies showing that, in order to be effective, punishment must meet certain requirements (Sundel & Sundel, 1993) not easily reached by the criminal system: intensity, temporal proximity,

availability of reward, schedule of delivery, and availability of alternative behaviours (Moffitt, 1983).

In his book *Why people obey the law*, Tom Tyler (1990) describes the impact on law compliance of variables included in the classical model of deterrence, and variables related to social norms and individuals' personal ethics. The results showed that personal morality (wrongness of breaking each law) and participant gender and age were the best predictors of compliance. The perceived moral obligation to obey the law and peer disapproval also had higher impacts than deterrence variables – such as the certainty of apprehension and punishment – and showing support for the authorities. The perceived moral obligation to obey the law was defined by Tyler (1990) as people's feelings about the degree to which 'they should comply with directives from police officers or judges, irrespective of their personal feelings' (p.45).

The impact of deterrence variables, perceived immorality, and legitimacy on compliance with the law has been examined by comparing ordinary and environment-related laws by Elffers, Van der Heijden, and Hazemans (2003) and May (2005). In the study by Elffers *et al.* (2003), the severity of the sanction and the perceived likelihood of being sanctioned predicted self-reported compliance with the law on individual rent subsidy but not on agricultural chemicals. May (2005) also found these variables useful in relation to normative behaviour towards the environment of marine facilities workers but not of that of farmers or building contractors. In both studies, the perceived immorality of the fact and the legitimacy of the law and of the authority that enforces it were more predictive for the other laws/behaviours.

Studies by Wenzel (2004a, 2004b; Wenzel & Jobling, 2006) on compliance with tax laws suggest a complex relationship between deterrence variables and norms. His results have shown that personal norms on tax honesty moderated the effects of deterrence variables on tax evasion. Deterrence variables may have an effect on tax evasion, but only when social norms are strongly against tax evasion and have not been internalized because participants do not identify with the group. Under any other circumstances, deterrence variables have no effect on tax evasion, which is largely explained by social norms internalized as personal norms by participants who identify with the group. Wenzel's results are coherent with the social categorization theory (Turner, 1991), which explains how individuals internalize social norms as personal norms through the process of self-categorization and identification with the group.

Social and personal norms on anti-ecological behaviour

The theory and research on social and personal norms about anti-ecological behaviour may also be relevant for developing a model for compliance with ELs, although the illegality of these behaviours has not been usually taken into account.

The focus theory of normative conduct (Cialdini, Kallgren, & Reno, 1991; Cialdini, Reno, & Kallgren, 1990) is a psychosocial theory built on the concept of social norms to explain and predict social behaviour, which has been explicitly applied to anti-ecological behaviour. The authors state that social norms motivate behaviour only when they are activated and therefore made available for consciousness. This theory also posits that there are two types of social norms, each referring to separate sources of human motivation. Injunctive social norms involve perceptions of which behaviours are typically approved or disapproved by most people and are motivated by rewards or punishments. Descriptive social norms involve perceptions of which behaviours are performed by most people and are motivated by the fact that they provide evidence of what is effective and

adaptive. The activation of one or other type of norm generates different behaviours (Reno, Cialdini, & Kallgren, 1993).

Studies led by Cialdini (Cialdini *et al.*, 1990, 2006) on the effects of injunctive and descriptive social norms on anti-ecological behaviour have shown that making participants focus on the frequency of an ET increases the occurrence of this behaviour, for example, being more likely to throw litter onto a dirty rather than a clean floor. Along the same lines, Corral-Verdugo, Frías-Armenta, Pérez-Urías, Orduña-Cabrera, and Espinoza-Gallego (2002) found that the more others are perceived to be wasting water, the fewer the reasons for conservation and the higher the water consumption. Cialdini *et al.* (2006) report that activation of injunctive social norms was more effective in preventing taking petrified wood from a national park than activating descriptive social norms. The activation of descriptive social norms increases the occurrence of anti-ecological behaviours, but also enhances pro-environmental behaviours such as recycling (Cialdini, 2003). Moreover, he states that descriptive social norms influence ecological behaviour together with other variables such as previous attitudes towards the specific behaviour, information, and sense of humour included in the message.

Thørgensen (2006) used the focus theory of normative conduct (Cialdini *et al.*, 1990) described above, the norm-activation theory (Schwartz, 1977), and the self-determination theory (Ryan & Deci, 2000) to elaborate a taxonomy of norms regulating responsible environmental behaviour. Schwartz's (1977) norm-activation theory holds that altruistic behaviour occurs in response to personal moral norms activated in individuals who believe that particular conditions represent a threat to others and that actions that they could initiate could avert those consequences (Stern, 2000). Personal norms are individuals' self-expectations of the behaviour in a specific situation and are experienced as feelings of moral obligations. Personal norms take a central position in Schwartz's model, becoming a moderator of the influence of situational and personality trait factors on behaviour. These factors only influence behaviour if they activate personal norms (Schwartz, 1977, p. 226, 250). The self-determination theory (Ryan & Deci, 2000) focuses on the social and contextual conditions that foster or prevent intrinsic motivation, self-regulation, and personal well-being processes. Among other contributions, the self-determination theory details the different types of extrinsic motivation and the factors that influence the internalization of intentional behaviour regulation. Following Ryan and Deci (2000), Thørgensen (2006) situated descriptive social norms (what most of my acquaintances do), subjective social norms (acquaintances' expectations on subject behaviour), and personal norms (feelings of moral obligation defined by internal reasons) in a continuum of increasing levels of internalization and integration into the self. Descriptive social norm is more externally motivated whereas subjective social norm is the person's perception of social pressures to perform a specific behaviour. Personal norm is based on guilt anticipation and feelings of obligation, involving both affective and cognitive processes tied to the self. The strongest relationship between norms and behaviour occurs for personal norms, defined in terms of Schwartz's (1977) norm-activation theory described above.

Corral-Verdugo and Frías-Amenta (2006) addressed the role of personal norms in specific environmentally responsible behaviour: water conservation. They showed that personal norms have a positive effect on the rational use of water and that they co-vary positively with beliefs in the efficacy of ELs related to water conservation. Subsequently, Martín, Hernández, and Ruiz (2007) studied the impact of deterrence variables and social norms on personal norms in breaches of ELs, and Frías-Armenta, Martín, and Corral-Verdugo (2009) went a step further by assessing the impact of these variables on

IAEB, using structural analysis. Lastly, Hernández, Martín, Ruiz, and Hidalgo (2010) ran a study focusing on the role of place identity in which stepwise analysis is used to disclose the links between norms, environmental attitudes, and IAEB. In their model, norms on ELs and environmental attitudes influenced the likelihood of IAEB, according to the theory of reasoned action and the theory of planned behaviour (Ajzen, 1985; Fishbein & Ajzen, 1975). Both theories stress the impact of social norms on predicting behavioural intention by suggesting that, if people evaluated a given behaviour as positive (attitude), and if they perceive that their significant others wanted them to perform this behaviour (subjective norm), the outcome would be a higher intention to behave in that way (motivation) and they would be more likely to do so (Ajzen, 1985; Fishbein & Ajzen, 1975).

The model on compliance with EL

The aim of this study is to propose and test a comprehensive model of compliance with EL (Figure 1). A single model is hypothesized to explain IAEBs of both lay and expert people, given that research on subjective offence scaling has shown that, although the perception of different offences varies over time (Coombs, 1967; Thurstone, 1928) and is influenced by age, gender, and attitudes (Forgas, 1980), there are no substantial differences when participants are trained in law (García *et al.*, 2003).

Several differences regarding behaviours and the measurement of variables under examination have arisen in the studies already described. Despite these unmistakable differences, they do share the concern about the relative impact of social versus personal norm on behaviour, and of normative versus deterrence variables on behaviour. According to these studies, personal norm is the main antecedent of IAEB in the hypothesized model (see Figure 1). The stronger the personal norm rejecting IAEB, the less likely it will be for a person to develop IAEBs. This hypothesis is coherent with Schwartz's (1977) norm-activation theory and is supported by the empirical evidence provided by Wenzel (2004a, 2004b) for tax behaviour, Tyler (1990) for obeying the law, Thørgensen (2006) for pro-environmental behaviour, Corral-Verdugo and Frías-Armenta (2006) for water conservation, Frías-Armenta *et al.* (2009) for anti-ecological behaviours, and Hernández *et al.* (2010) for IAEB.

The IAEB is also expected to be positively influenced by descriptive social norm that also influences injunctive social norm (see Figure 1). The relationship between descriptive social norm and IAEB is hypothesized on the basis of the focus theory of normative conduct (Cialdini *et al.*, 1990) and the empirical evidence provided by Cialdini (2003) and Hernández *et al.* (2010). The influence of descriptive social norm on injunctive social norm is based on Thørgensen's (2006) continuum of internalization. Personal norm would be positively influenced by sustainability attitudes and injunctive social norm. Injunctive social norm is considered an antecedent of personal norm according to Wenzel (2004a, 2004b), Thørgensen's (2006) continuum of norm internalization, and Turner's (1991) social categorization theory, which explain how individuals internalize social norms as personal norms.

Given that compliance with ELs may be considered one type of environmentally relevant behaviour (Stern, 2000) and that sustainability attitudes have been associated to pro-environmental behaviour (e.g., Mobley *et al.*, 2010; Nigbur *et al.*, 2010), these attitudes are expected to influence IAEB, both directly and indirectly. The indirect influence is anticipated through personal norm, which in turn influences behaviour, as suggested by Schwartz's (1977) norm-activation theory. Direct influence, however,

derives from the theory of reasoned action and the theory of planned behaviour (Ajzen, 1985; Fishbein & Ajzen, 1975). In this study, sustainability attitudes are measured by future orientation and ecocentrism to the extent that both have been empirically related to several environmentally relevant behaviours (e.g., Heath & Gifford, 2006; Pinheiro & Corral-Verdugo, 2010; Thompson & Barton, 1994). A correlation between sustainability attitudes and deterrence variables is expected because future orientation seems to be needed for anticipating likelihood of detention, likelihood of sanction, and sanction severity (Bandura, 1986).

Injunctive social norm is expected to be positively affected by deterrence variables (see Figure 1). Thus, deterrence variables will not influence personal norm directly but through injunctive social norm. Studies by Wenzel (2004a, 2004b) on the relationship between deterrence and social and personal norm indicate that the direct influence of deterrence on IAEB will not be significant, its impact being through injunctive social norm and personal norm.

Method

Participants

Participants were 439 students (101 male and 338 female) at a large university, located on an island where ELs are particularly salient because of environmental protection (see http://www.todotenerife.es/). A total of 307 participants were in the three first years of Psychology, Pedagogy, or Speech Therapy majors, enrolled in a social psychology course, and 132 were senior students (4th and 5th year) at Law School. Ages ranged from 18 to 58 years ($M = 22.4$, $SD = 5.61$).

Instruments

An anonymous self-report questionnaire was developed to assess the variables for inclusion in the model. Participants responded using Likert-type scales ranging from 0 = *Not at all* to 10 = *Very much*, except for the variable Descriptive Social Norm, in which scores ranged from 0 = *Nobody* to 10 = *A lot of people*. The questionnaire was divided into two sections. The first section included 10 separate questions (scales) to assess IAEB, deterrence variables, and personal and social norms. All these scales, except those related to IAEB, were developed by Martín *et al.* (2007) and were mainly based on Cialdini *et al.* (1990), Tyler (1990, 2006a, 2006b), and Wenzel (2004a, 2004b) and were intended to measure following five variables: Illegal Anti-Ecological Behaviour (2 scales), Descriptive Social Norms (1 scale), Injunctive Social Norms (2 scales), Personal Norms (2 scales), and Deterrence (3 scales).

Illegal Anti-Ecological Behaviour included two scales: (a) 'How often have you performed the following behaviours in the last year?' (Past Illegal Anti-Ecological Behaviour), and (b) 'If you were in the following situations, to what extent is it likely that you would perform the behaviours described?' (Likelihood of Future Illegal Anti-Ecological Behaviour). Likelihood of Future Illegal Anti-Ecological behaviour was measured as some anti-ecological behaviours are uncommon due to a lack of conditions or opportunities. Knowing whether participants would act in this way if they had the chance to do so thus became a complementary way of approaching their IAEB.

Descriptive Social Norm involved the scale 'How many people do you think have performed the following behaviours in the last year?' that follows Cialdini *et al.*'s definition (Cialdini *et al.*, 1990, 1991). *Injunctive Social Norm* was measured by two

scales: (a) 'To what extent do you think people consider it wrong to perform the following behaviours?' (Perceived Social Norm) and (b) 'To what extent are you sure that the following behaviours are illegal?' (Perceived Illegality). The first question relates to Cialdini *et al.*'s definition of injunctive social norms (Cialdini *et al.*, 1990, 1991) and to Wenzel's (2004a, 2004b) questions on social norms. The second scale assesses injunctive social norms considering that laws are the written formalization of social norms, as stated by natural law theories (Finnis, 2002).

Personal Norm included two scales: (a) 'To what extent do you personally believe that it is wrong to perform the following behaviours?' (Moral Judgment), and (b) 'To what extent do you think there should be a law that punishes people who behave in this way?' (Need of Regulation). The first question was taken literally from Tyler (1990), whereas the second was used by Gunningham and Sinclair (2002) and by May (2004, 2005) to approach legitimacy of the law, consistently with Tyler's (2006a, 2006b) definition of legitimacy of the law as coherence with individuals' moral values.

Deterrence entailed three scales: (a) 'To what extent would you be likely to be discovered if you performed any of the following behaviours?' (Likelihood of Being Caught), (b) 'To what extent would you be likely to receive a sanction if you performed any of the following behaviours?' (Likelihood of Being Sanctioned), and (c) 'If you were sanctioned for the following behaviours, how severe would the sanction be?' (Severity of Sanction). The first and third questions were formulated according to Wenzel (2004a, 2004b) and the second according to both Wenzel and Tyler (1990).

Every scale was a question relating to seven breaches of ELs: driving a vehicle off-road in a Nature Reserve; setting up a tent and camping on a beach without authorization; allowing sewage to drain into the sea from a small restaurant/bar at the beach; building a two-storey house on own land zoned only for agricultural use; playing music in own bar loudly enough to be heard from neighbours' homes; disposing of construction debris and old electrical household appliances in a vacant lot in own neighbourhood, and shooting protected species while hunting. The selection of these transgressions was meticulous because previous research varied largely in the type of behaviours under study, ranging from tax evasion (Wenzel), littering and the removal of petrified woods from a national park (Cialdini), and water wastage (Corral-Verdugo). Tyler (1990) even included six forms of illegal behaviours from three categories: ETs, driving offences, and theft. The type of behaviour under study is important because the size of the impact of the explanatory variables on compliance varies when different types of law are involved (Elffers *et al.*, 2003; May, 2005).

As the purpose of this study was to develop a comprehensive model of compliance with EL in general terms, IAEBs were selected according to their representativeness of the legal and psychosocial universe of possible ETs (see Hernández *et al.* 2005; Martín, Hernández, *et al.*, 2008; Martín, Salazar-Laplace *et al.*, 2008 for a more detailed description of the process and for comparisons of the perception of several ETs). Each behaviour referred to participants' surroundings to ensure participants' familiarity with the behaviours being scored. Participants' responses to each question on norms and deterrence variables were averaged across the seven IAEBs to obtain a single score for each scale.

The second part of the questionnaire required participants to complete the scales of Moral Obligation to Obey the Law, Future Orientation, and Ecocentrism. The Moral Obligation to Obey the Law scale was Oceja, Fernández-Dols, González, Jiménez, and Berenguer's (2001) Spanish adaptation of Tyler's (1990) 6-item scale. Future Orientation was measured using Díaz-Morales's (2006) Spanish adaptation of the 11-item subscale

from Zimbardo and Boyd's (1999) temporal perspective questionnaire. Ecocentrism was measured by Amérigo, González, and Aragonés's (1995) Spanish adaptation of a 10-item subscale from Thompson and Barton's (1994) environmental attitude questionnaire.

The questionnaire also included items on socio-demographic data, such as gender, age, and place of residence to determine the sample profile. Two versions of the questionnaire were prepared to counteract any carry-over effect in the responses, using two orders for the seven ETs in each scale and for the items of the attitude scales.

Procedure

Participants answered the questionnaire in their classrooms. They were told that a social-psychology research team had been carrying out a study on behaviours related to law enforcement in their region and that students had been asked to give their opinion about the frequency of several behaviours, people's disposition to behave in certain ways, and the reasons for doing so. Knowledge of the law and legal expertise was emphasized for law students, but no specific reference was made to ELs.

Anonymity was assured following the procedure described in most published papers using self-report measures. Instructions at the beginning of the tool read, accordingly: 'Questionnaires are totally anonymous and will be destroyed as soon as the answers are coded in data bases in which it is not possible to identify any person who answered the questionnaire. Therefore, you can answer with total honesty, because your anonymity is absolutely guaranteed'. Self-reports such as these have been successfully used to measure ordinary crime as driving offences and theft (Tyler, 1990), or tax evasion (Wenzel, 2004a, 2004b). Therefore, there was no reason to expect that participants were afraid of admitting things as 'disposing of construction debris and old electrical household appliances in a vacant lot in own neighbourhood in an anonymous questionnaire' when in Tyler (1990)'s and Wenzel's (2004a, 2004b) studies, participants admitted without any problem to have committed theft or tax evasion.

Data analysis

Cronbach's αs were calculated for each scale as indicators of reliability. Univariate analyses, including means, standard deviations, minimum, and maximum values were also obtained, as well as correlations between the scales. The means of response to items in a scale were employed as indexes to represent the observed variables used to devise a structural equation model. Structural equation modelling is comprised of a measurement and a structural model (Ullman, 2006). The measurement model is a confirmatory factor analysis created from the relationship between observed variables or indexes and their corresponding latent variables. These relationships are indicated by the regression coefficients (γ). The significant relationships between indexes and their corresponding latent variables indicate the convergent construct validity of the measures used (Corral-Verdugo & Figueredo, 1999). Following the hypothesized model, latent variables and their respective indexes were specified, as described in the Instrument section and displayed in Figure 1. The structural model estimates the effects between the constructed factors called latent variables. These relations are indicated by structural coefficients (β). The relationships anticipated between these latent variables were defined in the description of the hypothesized model and displayed in Figure 1.

Goodness-of-fit indicators for this model were considered. Goodness of fit shows the pertinence of a theory and the relationships between the variables established in the

model. It is measured by analyzing the association between the theory and the data used to prove that theory. Statistical and practical indicators are used to measure the model's goodness of fit (Ullman, 2006). The statistical indicators included χ^2, which assesses the difference between the proposed and the saturated model. If the theoretical and saturated models are not different, χ^2 will have a low, non-significant value ($p > .05$). However, since a large sample size usually results in a significant value of this indicator, the practical indexes are preferred over the statistical index (Bentler, 2006). Practical indicators came from χ^2 and controlled the effect of the sample size on the significance level when the two models were compared. The practical indexes utilized were the Bentler-Bonnet Normed Fix Index (BBNFI), the Comparative Fix Index (CFI), and the Bentler-Bonnet Non-Normed Fix Index (BBNNFI). They should have a value higher than .90 (Bentler, 2006). The Root Mean Squared Error (RMSEA) index, which requires a value below .08, was also used (Browne & Cudeck, 1993).

Results

Descriptive statistics and Cronbach's α for all the scales are given in Table 1. The reliability values were good in general terms, except for the scales of Past Illegal Anti-Ecological Behaviour and Future Orientation that had a Cronbach's α lower than .60. To attain adequate values of internal consistency, three items were eliminated from the scale of Future Orientation and two items from the scale of Past Illegal Anti-Ecological Behaviour, reaching α values of .79 and .74, respectively.

No differences were found in any of the variables of the study between participants trained in law and those who were not. Therefore, all subsequent analyses were carried out including all participants.

Table 2 displays correlations between the variables to be included in the model. Most correlations are seen to be statistically significant, higher for variables included in the same latent variables, and lower for variables included in different latent variables.

Results of the structural model are shown in Figure 1. The circles represent latent variables and the rectangles the observed variables. Observed variables are the indexes created by averaging the items of each scale, as described above. The relations are represented by arrows: straight lines are significant ($t > 1.96$; $p < .05$) and broken lines correspond to non-significant associations. The model explains 50% of the variance of Illegal Anti-Ecological Behaviour. Indicators of goodness of fit are also shown in Figure 1. Although χ^2 was significant, probably because of the large number of participants in the study, the remaining indicators demonstrate the adequacy of the model tested (BBNFI = .91, BBNNFI = .92, CFI = .95, RMSEA = .05; Bentler, 2006).

According to the results of the measurement model, the five specified latent variables emerged coherently from the regression standardized coefficients of their corresponding indexes. Likelihood of Being Caught ($\gamma = .58$), Likelihood of Being Sanctioned ($\gamma = .87$), and Severity of Sanction ($\gamma = .64$) were the indexes of the latent variable Deterrence. Perceived Illegality ($\gamma = .69$) and Perceived Social Norm ($\gamma = .41$) were significantly related to the latent variable Injunctive Social Norm. Moral Judgment ($\gamma = .90$), Need of regulation ($\gamma = .82$), and Moral Obligation to Obey the Law ($\gamma = .30$) produced the latent variable Personal Norm. Future Orientation ($\gamma = .56$) and Ecocentrism ($\gamma = .59$) indexes corresponded to the latent variables Sustainability Attitudes. Illegal Anti-Ecological Behaviour laws were indicated by Past Illegal Anti-Ecological

Table 1. Means, standard deviations, and Cronbach's αs

Variable/scale	Mean	*SD*	Min	Max	α
Past illegal anti-ecological behaviour	0.14	0.59	0	7.40	.74
Driving off-road in a nature reserve	0.23	1.04	0	10	
Camping on a beach without authorization[a]	1.14	2.47	0	10	
Allowing sewage water to drain into the sea	0.12	0.70	0	8	
Building a two-storey house on agricultural land	0.11	0.85	0	10	
Playing music loudly enough to be heard from neighbours' homes (NH)[a]	1.58	2.58	0	10	
Disposing of construction debris (CD) and old electrical household appliances (EHA) in a vacant lot	0.24	0.98	0	8	
Shooting protected species while hunting	0.03	0.44	0	9	
Likelihood of future illegal anti-ecological behaviour	2.06	1.46	0	7.71	.71
Driving off-road in a nature reserve	1.30	2.10	0	10	
Camping on a beach without authorization	4.64	3.35	0	10	
Allowing sewage water to drain into the sea	.64	1.61	0	10	
Building a two-storey house on agricultural land	2.26	2.71	0	10	
Playing music loudly enough to be heard from NH	3.89	2.97	0	10	
Disposing of CD and old EHA in a vacant lot	1.31	2.09	0	10	
Shooting protected species while hunting	.36	1.26	0	10	
Descriptive social norm	6.33	1.43	1.71	10	.78
Driving off-road in a nature reserve	4.44	2.55	0	10	
Camping on a beach without authorization	7.39	2.00	0	10	
Allowing sewage water to drain into the sea	5.98	2.34	0	10	
Building a two-storey house on agricultural land	6.14	2.17	0	10	
Playing music loudly enough to be heard from NH	8.12	1.75	0	10	
Disposing of CD and old EHA in a vacant lot	7.29	1.94	0	10	
Shooting protected species while hunting	4.95	2.40	0	10	
Perceived social norm	5.61	1.72	0.86	10	.80
Driving off-road in a nature reserve	6.06	2.57	0	10	
Camping on a beach without authorization	4.03	2.67	0	10	
Allowing sewage water to drain into the sea	6.65	2.49	0	10	
Building a two-storey house on agricultural land	5.03	2.53	0	10	
Playing music loudly enough to be heard from NH	4.96	2.65	0	10	
Disposing of CD and old EHA in a vacant lot	5.45	2.56	0	10	
Shooting protected species while hunting	7.13	2.46	0	10	
Perceived illegality	7.85	1.68	1.14	10	.80
Driving off-road in a nature reserve	8.33	2.43	0	10	
Camping on a beach without authorization	7.69	2.51	0	10	
Allowing sewage water to drain into the sea	8.23	2.30	0	10	
Building a two-storey house on agricultural land	7.63	2.70	0	10	
Playing music loudly enough to be heard from NH	6.57	2.72	0	10	
Disposing of CD and old EHA in a vacant lot	7.61	2.61	0	10	
Shooting protected species while hunting	8.91	2.08	0	10	
Moral judgment	7.72	1.31	1.43	10	.73
Driving off-road in a nature reserve	8.45	1.97	0	10	
Camping on a beach without authorization	4.81	2.90	0	10	
Allowing sewage water to drain into the sea	9.37	1.21	0	10	
Building a two-storey house on agricultural land	6.95	2.72	0	10	
Playing music loudly enough to be heard from NH	6.50	2.43	0	10	
Disposing of CD and old EHA in a vacant lot	8.34	1.86	0	10	
Shooting protected species while hunting	9.62	1.08	0	10	

Continued

Table 1. Continued

Variable/scale	Mean	*SD*	Min	Max	α
Need of regulation	7.95	1.36	1.71	10	.75
Driving off-road in a nature reserve	8.49	2.04	0	10	
Camping on a beach without authorization	5.27	3.05	0	10	
Allowing sewage water to drain into the sea	9.46	1.17	1	10	
Building a two-storey house on agricultural land	7.38	2.52	0	10	
Playing music loudly enough to be heard from NH	6.96	2.50	0	10	
Disposing of CD and old EHA in a vacant lot	8.51	1.93	0	10	
Shooting protected species while hunting	9.59	1.15	1	10	
Likelihood of being caught	5.11	2.00	0	10	.80
Driving off-road in a Nature Reserve	4.94	3.17	0	10	
Camping on a beach without authorization	5.31	2.78	0	10	
Allowing sewage water to drain into the sea	4.96	3.06	0	10	
Building a two-storey house on agricultural land	6.34	2.99	0	10	
Playing music loudly enough to be heard from NH	6.67	2.75	0	10	
Disposing of CD and old EHA in a vacant lot	3.56	2.70	0	10	
Shooting protected species while hunting	3.99	3.07	0	10	
Likelihood of sanction	5.93	2.31	0	10	.86
Driving off-road in a Nature Reserve	6.11	3.23	0	10	
Camping on a beach without authorization	5.12	3.09	0	10	
Allowing sewage water to drain into the sea	6.36	3.12	0	10	
Building a two-storey house on agricultural land	7.00	2.80	0	10	
Playing music loudly enough to be heard from NH	5.53	3.03	0	10	
Disposing of CD and old EHA in a vacant lot	4.73	3.07	0	10	
Shooting protected species while hunting	6.68	3.41	0	10	
Severity of sanction	6.00	1.54	0.43	9.71	.76
Driving off-road in a Nature Reserve	6.30	2.64	0	10	
Camping on a beach without authorization	3.98	2.36	0	10	
Allowing sewage water to drain into the sea	7.05	2.40	0	10	
Building a two-storey house on agricultural land	7.36	2.16	0	10	
Playing music loudly enough to be heard from NH	4.70	2.45	0	10	
Disposing of CD and old EHA in a vacant lot	4.86	2.44	0	10	
Shooting protected species while hunting	7.78	2.35	0	10	
Moral obligation to obey the law	6.20	1.76	0	10	.77
Obeying the law even if going against what is right	7.09	2.54	0	10	
Following the law even if thinking it is wrong	7.04	2.36	0	10	
Disobeying the law is seldom justified	6.42	2.54	0	10	
Breaking the law and keeping one's self-respect	5.03	2.81	0	10	
Person refusing to obey the law is a menace	5.96	2.57	0	10	
Obedience and respect for authorities virtues children should learn	5.71	2.64	0	10	
Future orientation	7.55	1.34	1.57	10	.79
Person's day should be planned ahead[a]	4.22	2.95	0	10	
Setting goals and considering specific means[a]	6.74	2.94	0	10	
Meeting tomorrow's deadlines comes before play	7.69	2.09	0	10	
It upsets me to be late for appointments [a]	6.93	2.51	0	10	
Meeting obligations to friends and authorities	7.75	2.28	0	10	
Before making decision weighing up costs and benefits	8.15	1.64	0	10	

Continued

Table 1. Continued

Variable/scale	Mean	*SD*	Min	Max	α
Completing projects by making steady progress	7.57	1.96	0	10	
I make lists of things to do	7.72	1.95	0	10	
Resisting temptations when there is work to do	7.02	1.94	0	10	
Thinking about bad things that happened in the past	6.97	2.25	0	10	
There will always be time to catch up on my work[a]	5.05	2.40	0	10	
Ecocentrism	7.74	1.40	2	10	.84
I can enjoy spending time in natural settings	8.01	2.09	0	10	
I prefer wildlife reserves to zoos	8.06	2.18	0	10	
I need time in nature to be happy	6.54	2.39	0	10	
Nature is valuable for its own sake	8.85	1.84	0	10	
When I am unhappy, I find comfort in nature	6.73	2.48	0	10	
One reason to conserve is to preserve wild areas	7.55	2.10	0	10	
Sad to see natural environments destroyed	8.40	1.92	0	10	
Sometimes animals seem almost human to me	7.44	2.40	0	10	
Being out in nature is a great stress reducer for me	7.51	2.22	0	10	
Humans are part of ecosystems like other animals	8.21	2.15	0	10	

[a] Eliminate from the scale to obtain the alpha displayed in the table

Behaviour ($\gamma = .33$) and Likelihood of Future Illegal Anti-Ecological Behaviour ($\gamma = .75$).

The path standardized coefficients of the structural model show that the Deterrence factor had a positive and significant effect on Injunctive Social Norm ($\beta = .45$), but no significant effect on Personal Norm or Illegal Anti-Ecological Behaviour. Injunctive Social Norm significantly and positively influenced Personal Norm ($\beta = .71$). Sustainability Attitudes had a positive and significant effect on Personal Norm ($\beta = .62$) and on Illegal Anti-Ecological Behaviour ($\beta = -.27$). Lastly, the exogenous variable Descriptive Social Norm affected the Illegal Anti-Ecological Behaviour factor ($\beta = .33$) and Injunctive Social Norm factor ($\beta = .14$). Also, there is a significant correlation between Deterrence and Sustainability Attitudes ($r = .32$).

The model was tested also for each of the seven IAEBs separately. The magnitudes and rank orders of model coefficients varied across the individual behaviours, but the fit indexes and the structure of the model were replicated. Therefore, these analyses will not be described here in more detail, because they did not add interestingly to the general pattern of results.[1] Furthermore, the model was compared with an alternative model, which only included punishment- and norm-related variables, but not sustainability attitudes. The structure of the simpler model was the same as the more complex model, and its indexes of fit were only slightly higher (χ^2 (35) = 61.3962, $p < .004$, BBNFI = .93, BBNNFI = .95, CFI = .97, RMSEA = .04), likely because of the reduced number of variables included. However, the explained variance of the simpler model was reduced about 7% (43.3 vs. 49.9%).

[1] *Results of the separate analyses are available from the first author upon request.*

Table 2. Correlations between the variables of the model

	Past illegal anti-ecological behaviour	Likelihood of future illegal anti-ecological behaviour	Descriptive social norm	Perceived social norm	Perceived illegality	Moral judgment	Need of regulation	Likelihood of being caught	Likelihood of being sanctioned	Severity of sanction	Moral obligation to obey the law	Future orientation
Likelihood of future illegal anti-ecological behaviour	.38*											
Descriptive social norm	.14*	.17*										
Perceived social norm	−.08	−.07	−.07									
Perceived illegality	−.05	−.11**	.13*	.26*								
Moral judgment	−.23*	−.35*	.14*	.20*	.44*							
Need of regulation	−.25*	−.32*	.18*	.19*	.37*	.73*						
Likelihood of being caught	−.05	−.03	−.05	.29*	.12**	.18*	.13*					
Likelihood of being sanctioned	.01	−.03	−.07	.18*	.24*	.18*	.11**	.52*				
Severity of sanction	−.03	−.14*	.05	.28*	.23*	.28*	.23*	.35*	.55*			
Moral obligation to obey the law	−.20*	−.16*	.11**	.12**	.18*	.23*	.24*	.10**	.05	.12*		
Future orientation	−.12*	−.23*	.04	.22*	.24*	.31*	.28*	.13*	.17*	.25*	.26*	
Ecocentrism	−.07	−.20*	.22*	.02	.19*	.32*	.34*	.07	.13*	.14*	.10**	.30*

*Significant for $p < .01$; ** Significant for $p < .05$

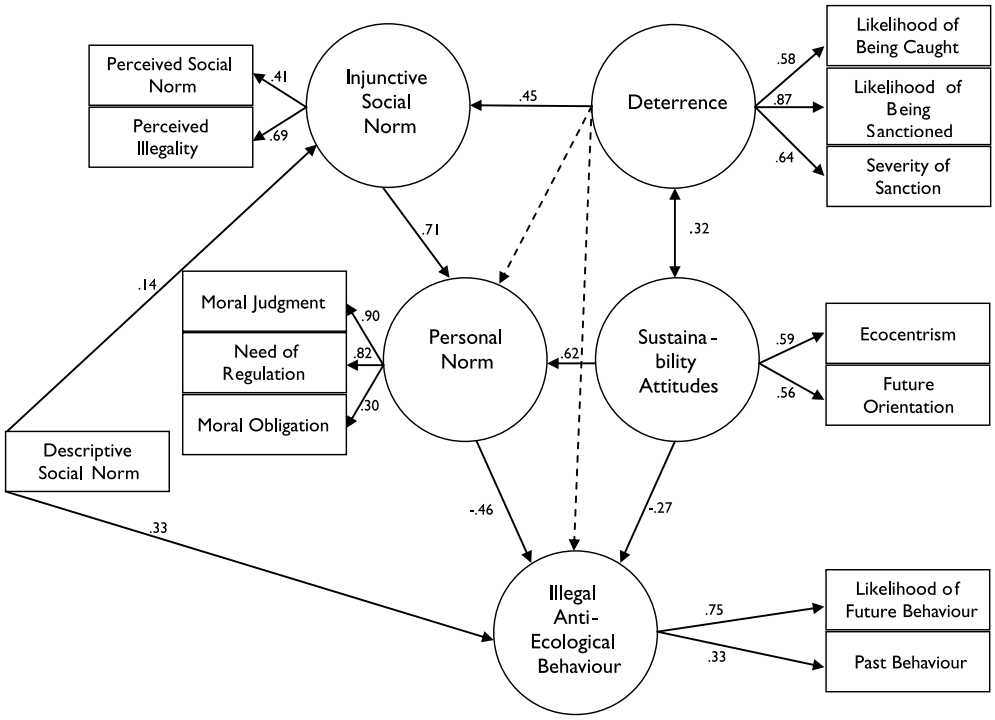

Figure 1. Results of the structural model on illegal anti-ecological behaviour.
Note. All regression and structural coefficients are significant at $p < .05$, except those indicated by broken lines. Goodness-of-fit summary for robust method, χ^2 (50) = 100.83; $p < .001$; BBNFI = .91. BBNNFI = .92. CFI = .95. RMSEA = .05. $R^2 = .50$.

Discussion

The proposed model predicted IAEB by combining sustainability attitudes with deterrence variables and with social and personal norms. As said above, deterrence variables and norms were chosen on the basis of the empirically supported knowledge derived from three classical theoretical frameworks, which have been used to understand behaviour motivated by punishment, illegal behaviour, and normative behaviour. The peculiarities of ETs were expected to be reflected in the nature and strength of the relationships among these variables. This happens to some extent with tax offences (Wenzel, 2004a, 2004b), but the pattern hypothesized in this paper is one of the most comprehensive models on compliance with legal behaviour proposed until now in the field of criminological and legal psychology. Therefore, the results of this study not only support a model that is consistent with previous research, but also goes a step further in specifying the relationship between personal and social norms and in showing the role that sustainability attitudes play when ELs are involved. Indeed, when a model that includes just deterrence and norm-related variables is compared with a model including sustainability attitudes as well, the main structure of both models is alike and, although the indexes of fit of the more simple model are slightly higher, its explained variance is lower.

Environmental crime is a new area of research in legal and criminological psychology, in which theoretical formulations using psychological variables are only beginning to

emerge. There might be other equally plausible models, derived from other theoretical perspectives, which may have the same goodness of fit. These alternative models might be compared to the current model to check whether they might be nested or equivalent, using the procedure for Nesting and Equivalence Test (NET) described by Bentler and Satorra (2010). But note that the NET and its solutions would not solve the equivalence problem, because the number of alternative models may be infinite (MacCallum, Wegener, Uchino, & Fabrigar, 1993). This leads to the following questions. First, how many alternative models might be tested against a specific hypothesized model? Second, how to describe in a single paper all these alternative models, maintaining theoretical and empirical precision?

A specific model was hypothesized since the beginning of this study, but, given that research on ETs is an emerging field with scarce precedents, several alternative models were explored during the analysis of the data to lessen, but not to solve, the equivalence problem. In designing these alternative models, some variables were included or eliminated, and the sequence and the directions of the links between latent variables were changed several times. We will present a few examples just to illustrate both procedures, first concerning the elimination from the model of three variables included in previous studies using a different methodology (e.g., Martín *et al.*, 2007): the perception of authorities' procedural and distributive justice, as well as the significant others' disapproval. The perceptions of authorities' procedural and distributive justice were not included, because these variables did not increase the variance explained by the model. The exclusion of the significant others' disapproval was due to the fact that when included, the relationship between personal norm and social norm had to be reversed to get goodness of fit, and that made no theoretical sense. The reason was that the significant others' disapproval is a social norm that has been already introjected, in Ryan and Deci's (2000) terms. This means that the significant others' disapproval shares variance with the indexes of both latent variables, personal and social norms, reducing the goodness of fit of the model. In Hernández *et al.*'s (2010) model on ETs, less sophisticated in legal and criminological psychology terms, the prescriptive social norms influence the significant others' disapproval, which, in turn, influences the personal norms (measured just using the moral judgment) that, in turn, influence the illegal behaviour (measured just using the likelihood of future behaviour). The significant others' disapproval worked well in Hernández *et al.*'s, (2010) model, because only exogenous and not latent variables were included. However, that model and the model described in this study are coherent, because in both of them the descriptive social norm has an influence on behaviour by its own and not as an index of the injunctive social norms. Even more, descriptive social norms (more external) have an impact on injunctive social norms (more internal), fitting simultaneously Thorgensen's (2006) and Reno *et al.*'s (1993) data.

The following examples for the second procedure of exploring alternative models relate to the directions of the links between latent variables. The relationships between norms, attitudes, and behaviour were refined in the hypothesized pattern in response to a reviewer's precision about Fishben and Ajzen's (1975) model. As a result, norms and attitudes together influence behaviour, but they do so independently, with attitudes having an additional indirect impact on behaviour through personal norms, which is also coherent with Schwartz's (1977) formulations. This model improvement not only increased the percentage of explained variance, but also solved some theoretical incoherence, showing how theory and statistics help each other in the search for knowledge.

Another reviewer's concern we would like to comment on related to the potential equivalence of an alternative model, in which the link between behaviour and personal norm were reversed according to Bem's self-perception theory (Bem, 1967, 1972). The goodness of fit of this alternative model with the reversed link was not adequate, and, furthermore, the results obtained using NET showed that the current and the alternative model were neither nested or equivalent. Therefore, the directionality was kept as originally proposed.

Generally speaking, the equivalence problem is a limitation of the SE models themselves that has being discussed without reaching a solution since at least 1986 (chronologically, e.g., MacCallum *et al.* 1993; Raykow & Marcoulides, 2001; Stelzl, 1986; Ullman, 2006; Vandenberg & Grelle, 2009). This problem relays on the fact that alternative models cannot be distinguished on the basis of goodness of fit, but rather considering the interpretability of parameter estimates and the meaningfulness of a model – that is, in terms of their substantive meaning. This problem arises in both experimental and non-experimental research designs and threatens the validity of the conclusions. It is true that, although equivalent models may exist for most published papers using SE, this fact does not liberate researchers of considering the equivalence problem in any new publication (MacCallum *et al.*, 1993).

We therefore hope that the results and the discussion included in this study represent a sufficient challenge to stimulate more research on the topic in the field of legal and criminological psychology towards an accumulative construction of knowledge. This research would allow more alternative models to be hypothesized and tested, thus helping to solve the interpretational ambiguity that may result from using structural equation modelling. To get the best of the possible models, future studies should not only statistically test the equivalence of several alternative models, but carry out experimental designs to manipulate the key variables, or collect data through longitudinal designs (Bentler & Satorra, 2010; MacCallum *et al*., 1993).

Meanwhile, the theoretical coherence and the goodness of fit of the proposed model enable some conclusions on the relationships between the variables assessed and their respective indicators to be reached. To begin with, social and personal norms moderate the effect of deterrence variables on IAEB, as expected from the studies by Tyler (1990) and Wenzel (2004a, 2004b) and from traditional studies on deterrence (Paternoster, 1987, 2010). For ET prevention and control, it is, then, better to educate people and help them believe that it is right to comply with EL rather than rely on external surveillance and control. However, criminal codes and legal sanctions also have an effect on behaviour, by providing legitimacy for social prescriptions to allow their internalization in personal norms (Korsell, 2001).

Different types of social norms have also been found to have different ways of influencing behaviour, in line with Reno *et al.* (1993). What most people are perceived to do (descriptive norms) has a direct impact on ET, whereas what people are perceived to think exerts its impact on ETs only if it is internalized in personal norms. It may be that participants are more attentive to what other people do (descriptive social norms) than to what other people think or say (injunctive social norms) in relation to IAEB. This result is consistent with that found by Hernández *et al.* (2010), as said above. In psycho-social terms, it seems that the descriptive norms are closer to the conformity process (more external), whereas prescriptive norms are closer to persuasion processes (more internal), following Thørgensen's (2006) continuum. One possible implication of this result may be that it would be better to develop group-focused interventions that simultaneously foster conformity and persuasion processes, in line with the changes

induced by groups (Lewin, 1958), than interventions focused on individuals who may not be able to resist group pressure in another direction.

Personal norms are the main antecedent of the IAEB, involving both morality and legitimacy. In his original work, Tyler (1990) defines legitimacy as '. . . what people regard as just and moral as opposed to what is in their self-interest' (p. 13), measuring it '. . . as the perceived obligation to obey the law and as support for legal authorities' (p. 45). Tyler (2006b) later specified that legitimacy is 'the belief that authorities, institutions, and social arrangements are appropriate, proper, and just' (p. 376; see also Tyler 2006a, pp. 269–294). Legitimacy can therefore be considered both in relation to the authorities who enforce the law and in relation to the law itself. In this study, only legitimacy of the law was taken into account because of its higher predictive power in previous research (Tyler, 2006a, pp. 269–294), using both moral obligation to obey the law and need or regulation as indexes. The perceived need of regulation was included following Gunningham and Sinclair (2002) and May's (2004, 2005) suggestions, since the other options – the agreement between the law and the individual's moral principles (e.g., Darley, Carlsmith, & Robinson, 2000) and the perceived justice of the law (e.g., Nadler, 2005) – seemed to be closer to the concept of moral judgment, already measured by its index. The moral obligation to obey the law had been used previously as a way of measuring legitimacy not only by Tyler (1990; Tyler & Lind, 1992) but by Elffers *et al.* (2003). However, the data show that its power to explain IAEB as an index of personal norms is lower than that reported by Tyler's (1990) study on ordinary laws. Moreover, it may measure a different construct, possibly more related to conservatism (Wilson, 1973), which calls for future research.

As expected, sustainability attitudes play a significant role in the model, influencing IAEB both directly and indirectly. The indirect influence through personal norms is consistent with Schwartz's theory (1977) and with Hernández *et al.* (2010), who reported that the scores in Thompson and Barton's (1994) scale influenced IAEB through personal norm. But, there is also a direct relation coherent with the theories of reasoned action and planned action: behaviours in a specific domain are evidently related to attitudes towards that domain. But the lower size of the structural coefficient connecting sustainability attitudes with illegal anti-ecological behaviour supports the central role of personal norms in the model. The contributions of ecocentrism and orientation to future to the construct are similar. It is coherent that ecocentrism influences personal norm, considered as the internalization of social norms as moral obligation (Schwartz, 1977), especially when the fact that ecocentrism has been related to intrinsic motivation is taken into account (e.g., Suárez, Salazar-Laplace, Hernández, & Martín, 2007). The contribution of future orientation to sustainability attitudes is obvious because environmental preservation involves caring for the natural world over time. The correlation between sustainability attitudes and deterrence variables may also be easily understood, given that the latter involve the ability to anticipate the future consequences of behaviour.

For several reasons the above results should be considered with caution before final conclusions are reached. First, although structural equation modelling allows for directionality, the data included in the model are of a correlational nature and therefore causality should not be concluded. Second, the sample comprised a large number of participants of both genders, who ranged considerably in age, and came from several study backgrounds, but all were university students. It is true that Hernández *et al.* (2010) found a similar trend with a stratified sample from the general population, selected taking into account three age ranges and three zones of residence, in addition to gender.

However, their model did not include all the latent variables nor all the indexes assessed here.

Third, although the problem of achieving good internal consistency in measurements of negative behaviour is not exclusive to our study, this point deserves comment. By definition, negative behaviour is more infrequent and illegal behaviour even more so. The two behaviours eliminated from the self-reported IAEB scale were 'setting up a tent and camping on a beach without authorization' and 'playing music in one's own bar loudly enough to be heard from neighbours' homes'. Being that the participants were students, it is not strange that they had committed these ETs more often during the previous year (despite not owning the bar in question). But when participants were asked about these two behaviours in other scales, they were able to give answers and their perceptions of these two behaviours related to those of the other five behaviours, reaching adequate internal consistencies. When these items were eliminated from the other scales, Cronbach's α did not yield satisfactory values. Moreover, when the self-reported behaviour scale was removed from the model, the relationships between the latent variables were similar, although the percentages of explained variance and, to a lesser extent, the goodness of fit, were reduced. Therefore, eliminating both behaviours from the other scales or removing the self-reported behaviour scale from the model resulted in more losses than gains in ecological validity, theoretical and statistical terms. The 13 indexes of latent variables are measured by asking participants 13 specific questions, because the five latent variables are different constructs. The behaviours used to ask these questions are alike in all but in one case. The particularity of this case, 'past-behaviour', is that participants' answers are averaged in relation to only five behaviours instead of seven. Besides, the construct 'illegal anti-ecological behavior' is measured not only by 'past-behavior' but by 'likelihood of future behavior', in which the seven behaviours are averaged.

Separate analyses of the seven ETs showed that the magnitudes and rank orders of the model coefficients differ across the individual behaviours, pointing out peculiarities that may deserve further psycho-environmental investigation (e.g., differences in short- vs. long-term ecological impact). However, these peculiarities do not invalidate the principle capacity of the results of the current study in showing how the construct of illegal anti-ecological behaviour is related to psycho-legal variables. As the aim of the study was to find general principles, our focus has been on the communalities among ETs, instead of on the differences.

Finally, self-report measures should be used together with other external indicators of the variables under study, particularly behaviour. Although anonymity was guaranteed, false consensus (Ross, Greene, & House, 1977) may be influencing participants' responses. Suspicion of a false consensus bias could be dissipated by looking at the low correlation between self-reported behaviour and the perception of others' behaviour, but additional perception biases may still be likely. In any case, until our results are replicated with other samples, measures, and designs, conclusions on the topic should be cautious.

The main implication from this study is that personal norms should be enhanced to increase compliance with EL, and this may be done by fostering social norms and sustainability attitudes. Laws for environmental protection linked to very severe penalties already exist (Korsell, 2001; Parejo-Alfonso, 2008; Situ & Emmons, 2000; Tompkins, 2005; Watson, 2005). Strengthening penalties might not increase compliance but have the opposite effect (McCoun, 1993). The challenge is to increase the perceived probability of being sanctioned when not complying, the perceived need for regulation,

and the moral judgment on ET. Enhancing both the perceived illegality of behaviour and attitudes towards sustainability would also be helpful. Intervention strategies to reach these goals should focus on groups because of the influence of the perception of others' behaviour on an individual's own behaviour.

Future research still has much to clarify about the role of other variables, such as habits and routines (Stern, 2000), and the legitimacy of the authorities (Tyler, 2006a, 2006b), in increasing the percentage of explained variance of IAEB. Variations in the compliance with several categories of ETs also require further study, given that differences in people's perceptions have already been documented (Frías-Armenta & Martín, 2010; Martín & Hernández, 2008). To this end, this study provides a model on which new research and theoretical developments might be built.

Acknowledgements

This research has been supported by the Spanish Ministry of Science and Innovation by means of the I + D grant project PSI2009-08896. The authors would like to express their gratitude to the reviewers for their comments, especially on the equivalence problem and other theoretical and methodological concerns, which helped to notably improve the quality of this article. We are also grateful to Markus Conrad for his help in the reviewing process.

References

Ajzen, I. (1985). From intentions to action: A theory of planned behavior. In J. Kull & J. Beckmann (Eds.), *Action control from cognition to behavior*. New York: Springer-Verlag.

Alonso, I., Martín, A. M., Hess, S., & Ruiz, C. (2011). La relación entre los juicios morales y las explicaciones causales de los comportamientos delictivos: Un estudio con transgresiones medioambientales. [The relationship between moral judgments and causal explanations of offending behaviors: A study on environmental transgressions]. Paper presented at I Jornadas de Psicología y Ley, Barcelona, Spain.

Amérigo, M., González, A., & Aragonés, J. I. (1995). Antropocentrismo *versus* ecocentrismo en una muestra de estudiantes. [Antropocentrism versus ecocentrism in a student sample]. In E. Garrido & C. Herrero (Comps.), *Psicología política, jurídica y ambiental* (pp. 337–344). Madrid: Eudema.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory*. Englewood Cliffs, NJ: Prentice-Hall.

Bem, D. J. (1967). Self-perception: An alternative interpretation of cognitive dissonance phenomena. *Psychological Review*, *74*, 183–200. doi:10.1037/h0024835

Bem, D. J. (1972). Self-perception theory. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 6, pp. 1–62). San Diego, CA: Academic Press.

Bentler, P. M. (2006). *EQS, structural equations program manual*. Encino, CA: Multivariate Statistical Software, Inc.

Bentler, P. M., & Satorra, A. (2010). Testing model nesting and equivalence. *Psychological Methods*, *15*, 111–123. doi:10.1037/a0019625

Browne, M. W., & Cudeck, R. (1993). Alternative ways of assessing model fit. In K. A. Bollen & J. S. Long (Eds.), *Testing structural equation models* (pp. 136–162). Thousand Oaks, CA: Sage.

Church, R. (1963). The varied effects of punishment on behavior. *Psychological Review*, *70*, 369–402. doi:10.1037/h0046499

Cialdini, R. B. (2003). Crafting normative messages to protect the environment. *Current Directions in Psychological Science*, *12*, 105–109. doi:10.1111/1467-8721.01242

Cialdini, R. B., Demaine, L. J., Sagarin, B. J., Barrett, D. W., Rhoads, K., & Winter, P. L. (2006). Managing social norms for persuasive impact. *Social Influence*, *1*, 3–15. doi:10.1080/15534510500181459

Cialdini, R. B., Kallgren, C. A., & Reno, R. R. (1991). A focus theory of normative conduct: A theoretical refinement and re-evaluation. *Advances in Experimental Social Psychology*, *24*, 201–234.

Cialdini, R. B., Reno, R. R., & Kallgren, C. A. (1990). A focus theory of normative conduct: Recycling the concept of norms to reduce littering in public places. *Journal of Personality and Social Psychology*, *58*, 1015–1026.

Coombs, C. (1967). Thurstone's measurement of social values revisited forty years late. *Journal of Personality and Social Psychology*, *6*, 85–91. doi:10.1037/h0024522

Corral-Verdugo, V., & Figueredo, A. J. (1999). Convergent and divergent validity of three measures of conservation behavior: The multitrait-multimethod approach. *Environment & Behavior*, 31, 805–820. doi:10.1177/00139169921972353

Corral-Verdugo, V., & Frías-Armenta, M. (2006). Personal normative beliefs, antisocial behavior, and residencial water conservation. *Environment and Behavior*, *38*, 406–421. doi: 10.1177/0013916505282272

Corral-Verdugo, V. Frías-Armenta, M., Pérez-Urías, F., Orduña-Cabrera, V., & Espinoza-Gallego, N. (2002). Residential water consumption, motivation for conserving water, and the continuing tragedy of commons. *Environment Management*, *30*, 527–535. doi: 10.1007/s00267-002-2599-5

Darley, J. M., Carlsmith, K. M., & Robinson, P. H. (2000). Incapacitation and just deserts as motives for punishment. *Law and Human Behavior*, *24*, 659–684. doi: 10.1037/0022-3514.83.2.284

Díaz-Morales, J. F. (2006). Estructura factorial y fiabilidad del Inventario de Perspectiva Temporal de Zimbardo. [Factorial structure and reliability of Zimbardo's Temporal Perspective Inventory]. *Psicothema*, *18*, 565–571.

Elffers, H., Heijden, P., & Hezemans, M. (2003). Explaining regulatory non-compliance: A survey study of rule transgression for two Dutch instrumental laws, applying the randomized response method. *Journal of Quantitative Criminology*, *19*, 409–439. doi:10.1023/B:3AJOQC.0000005442.96987.9e

Finnis, J. (2002). Natural law: The classical tradition. In J. Coleman & S. Shapiro (Eds.), *The Oxford handbook of jurisprudence and philosophy of law* (pp. 1–59). New York: Oxford University Press.

Fishbein, M., & Ajzen, I. (1975). *Beliefs, attitudes, intention and behavior: An introduction to theory and research*. Reading, MA: Addison Wesley.

Forgas, J. P. (1980). Images of crime: A multidimensional analysis of individual differences in crime perception. *International Journal of Psychology*, *15*, 287–299. doi:10.1080/00207598008246998

Frías-Armenta, M., & Martín, A. M. (2010). Influence of Social and Legal Norms on Anti-Ecological Behavior. In V. Corral-Verdugo, C. H. Garcia-Cadena, & M. Frias-Armenta (Eds.), *Psychological approaches to sustainability: Current trends in theory, research and applications* (pp. 361–410). Halppauge, NY: Nova Science Publishers.

Frías-Armenta, M. Martín, A. M., & Corral-Verdugo, V. (2009) Análisis de factores que influyen en el desarrollo de normas ambientales y en la conducta anti-ecológica. [Analysis of the factors that influence the development of environmental norms and anti-ecological behaviour]. *Revista Interamericana de Psicología*, *43*, 278–286.

García, E., García, J., Fuente, L., Borges, A., Sánchez, A., & San Luis, C. (2003). Escalamiento subjetivo de conductas delictivas en legos y expertos. [Subjective scaling of offending behaviors in lay people and expert]. *Psicothema*, *15*, 638–642.

Gunningham, N., & Sinclair, D. (2002). *Leaders and laggards: Next generation environmental regulation*. Sheffield, UK: Greenleaf Press.

Heath, Y., & Gifford, R. (2006). Free-market ideology and environmental degradation: The case of belief in global climate change. *Environment & Behavior*, *38*, 48–71. doi:10.1177/0013916505277998

Hernández, B., Martín, A., Hess, S., Martínez-Torvisco, J., Suárez, E., Salazar, M., ... Ramírez, G. (2005). Análisis multidimensional de la percepción del delito ecológico. [Multidimensional scaling of the perception of environmental crime]. *Medio Ambiente y Comportamiento Humano*, *6*, 51–70.

Hernández, B., Martín, A., Ruiz, C., & Hidalgo, M. C. (2010).The role of place identity and place attachment in breaking environmental protection laws. *Journal of Environmental Psychology*, *30*, 281–288. doi:10.1016/j.jenvp.2010.01.009

Itoi, R., Ohbuchi, K. I., & Fukuno, M. (1996). A cross-cultural study of preference of account: Relationship closeness, harm severity, and motives of account making. *Journal of Applied Social Psychology*, *26*, 913–934. doi:10.1111/j.1559-1816.1996.tb01117.x

Korsell, L. E. (2001). Big stick, little stick: Strategies for controlling and combating environmental crime. *Journal of Scandinavian Studies in Criminology and Crime prevention*, *2*, 127–148. doi:10.1080/140438501753737615

Lewin, K. (1958). Group decision and social change. In E. E. Maccoby, T. M. Newcomb, & E. L. Hartley (Eds.), *Readings in social psychology* (pp. 197–211). New York, NY: Holt, Rinehart & Winston.

MacCallum, R. C., Wegener, D. T., Uchino, B. N., & Fabrigar, L. R. (1993). The problem of equivalent models in applications of covariance structure analysis. *Psychological Bulletin*, *114*, 185–199. doi:10.1037/0033-2909.114.1.185

Mårald, E. (2001). The BT Kemi scandal and the establishment of the environmental crime concept. *Journal of Scandinavian Studies in Criminology and Crime prevention*, *2*, 149–170. doi:10.1080/140438501753737624

Martín, A., & Hernández, B. (2008). La percepción social de las transgresiones contra el medio ambiente. [The social perception of the environmental transgressions]. *Boletín de la Sociedad Mexicana de Psicología*, *147*, 20–24.

Martín, A. M., Hernández, B., Hess, S., Suárez, E., Salazar-Laplace, M. E., & Ruiz, C. (2008). Valoración social y asignación de castigo en transgresiones a las leyes de protección del medio ambiente. [Social evaluation and punishment assignment for breaches of environmental laws]. *Psicothema*, *20*, 90–96.

Martín, A., Hernández, B., & Ruiz, C. (2007). Variables predictoras de la norma personal en transgresiones de las leyes medioambientales. [Predictors of the personal norm in breaches of environmental laws]. *Medio Ambiente y Comportamiento Humano*, *18*, 137–157.

Martín, A., Salazar-Laplace, M. E., Hess, S., Ruiz, C., Kaplan, M. F., Hernández, B., & Suárez, E. (2008). Individual breaches of environmental laws in cases from public administration files. *Deviant Behavior*, *29*, 611–639. doi:10.1080/01639620701839443

Martin, A., Salazar-Laplace, M. E., & Ruiz, C. (2008). The sequential analysis of transgressors accounts of breaking environmental laws. *The Spanish Journal of Psychology*, *11*, 115–124.

May, P. (2004). Compliance motivations: Affirmative and negative bases. *Law and Society Review*, *38*, 41–68. doi:10.1111/j.0023-9216.2004.03801002.x

May, P. (2005). Compliance motivations: Perspectives of farmers, homebuilders and marine facilities. *Law and Policy*, *27*, 317–347. doi:10.1111/j.1467-9930.2005.00202.x

McCoun, R. J. (1993). Drugs and the law: A psychological analysis of drug prohibition. *Psychological Bulletin*, *113*, 497–512. doi:10.1037/0033-2909.113.3.497

McGuire, J. (2002) Criminal sanctions versus psychologically-based interventions with offenders: A comparative empirical analysis. *Psychology, Crime & Law*, *8*, 183–208. doi:10.1080/10683160208415005

Mobley, C., Vagias, W., & DeWard, S. (2010). Exploring additional determinants of environmental behavior: The role of environmental literature and environmental attitudes. *Environment and Behavior*, *42*, 420–447. doi:10.1177/0013916508325002

Moffitt, T. (1983). The learning theory model of punishment: Implications for delinquency deterrence. *Criminal Justice and Behavior*, *10*, 131–158. doi:10.1177/0093854883010002001

Nadler, J. (2005). Flouting the law. *Texas Law Review*, *83*, 1400–1439.

Nigbur, D., Lyons, E., & Uzzell, D. (2010). Attitudes, norms, identity and environmental behaviour: Using an expanded theory of planned behaviour to predict participation in a kerbside recycling programme. *British Journal of Social Psychology*, *49*, 259–284. doi:10.1348/014466609X449395

Oceja, L. V., Fernández-Dols, J. M., González, A., Jiménez, I., & Berenguer, J. (2001). ¿Por qué cumplimos las normas? Un análisis psicosocial del concepto de legitimidad. [Why we comply with norms? A psychosocial analysis of the concept of legitimacy]. *Revista de Psicología Social*, *16*, 21–41. doi:10.1174/021347401317351189

Parejo-Alfonso, L. (2008). *Código de medio ambiente*. [Code of environment]. Cizur Menor, Spain: Aranzadi.

Paternoster, R. (1987). The deterrent effect of the perceived certainty and severity of punishment: A review of the evidence and issues. *Justice Quarterly*, *4*, 173–217. doi:10.1080/07418828700089271

Paternoster, R. (2010). How much do we really know about criminal deterrence? *The Journal of Criminal Law & Criminology*, *100*, 765–824.

Pinheiro, J. Q., & Corrral-Verdugo, V. (2010). Time perspective and sustainable behavior. In V. Corral-Verdugo, C. H. Garcia-Cadena, & M. Frias-Armenta (Eds.), *Psychological approaches to sustainability: Current trends in theory, research and applications* (pp. 205–224). Halppauge, NY: Nova Science Publishers.

Polinsky, A. M., & Shavell, S. (2000). The economic theory of public enforcement of law. *Journal of Economic Literature*, *38*, 45–76. doi:10.1257/jel.38.1.45

Raykov, T., & Marcoulides, G. A. (2001). Can there be infinitely many models equivalent to a given covariance structure model? *Structural Equation Modeling*, *8*, 142–149. doi:10.1207/S15328007SEM0801_8

Reno, R. R., Cialdini, R. B., & Kallgren, C. A. (1993). The transituational influence of social norms. *Journal of Personality and Social Psychology*, *64*, 104–112. doi:10.1037/0022-3514.64.1.104

Ross, L., Greene, D., & House, P. (1977). The false consensus phenomenon: An attributional bias in self-perception and social perception processes. *Journal of Experimental Social Psychology*, *13*, 279–301. doi:10.1016/0022-1031(77)90049-X

Ryan, R. M., & Decy, E. L. (2000). Self-determination theory and the facilitation of intrinsic motivation, social development, and well-being. *American Psychologist*, *55*, 68–78. doi:10.1037/0003-066X.55.1.68

Schwartz, S. H. (1977). Normative influence in altruism. In L. Berkowitz (Ed.), *Advances in experimental social psychology* (Vol. 10, pp. 221–279). New York: Academic Press. doi:10.1016/S0065-2601(08)60358-5

Situ, Y. (1998). Public transgression of environmental law: A preliminary study. *Deviant Behavior*, *19*, 137–155. doi:10.1080/01639625.1998.9968080

Situ, Y., & Emmons, D. (2000). *Environmental crime*. London, UK: Sage.

Skinner, B. F. (1938). *The behavior of organisms: An experimental analysis*. Oxford, England: Appleton-Century.

Stelzl, I. (1986). Changing a causal hypothesis without changing the fit: Some rules for generating equivalent path models. *Multivariate Behavioral Research*, *21*, 309–331. doi:10.1207/s15327906mbr2103_3

Stern, P. C. (2000). Toward a coherent theory of environmentally significant behavior. *Journal of Social Issues*, *56*, 407–424. doi:10.1111/0022-4537.00175

Suárez, E., Salazar-Laplace, M. E., Hernández, B., & Martín, A. (2007) ¿Qué motiva la valoración del medio ambiente? La relación del ecocentrismo y del antropocentrismo con la motivación interna y externa. [What motivate environment evaluation? The relationship of ecocentrism and anthropocentrism with internal and external motivation]. *Revista de Psicología Social*, *22*, 235–244. doi:10.1174/021347407782194434

Sundel, M., & Sundel, S. (1993). *Behavior modification in the human services: A systematic introduction to concepts and applications*. Newbury Park, CA: Sage.

Thompson, S. C. G., & Barton, M. (1994). Ecocentric and anthropocentric attitudes toward the environment. *Journal of Environmental Psychology*, *14*, 149–157. doi:10.1016/S0272-4944(05)80168-9

Thørgensen, J. (2006). Norms for environmentally responsible behavior: An extended taxonomy. *Journal of Environmental Psychology*, *26*, 247–261. doi:10.1016/j.jenvp.2006.09.004

Thorndike, E. L. (1911). *Animal intelligence*. New York: Macmillan.

Thurstone, L. L. (1928). The method of paired comparisons for social values. *Journal of Abnormal and Social Psychology*, *21*, 384–400. doi:10.1037/h0070476

Tompkins, K. (2005). Police, law enforcement and environment. *Current Issues in Criminal Justice*, *16*, 294–306.

Turner, J. C. (1991). *Social influence*. Buckingham, UK: Open University Press.

Tyler, T. R. (1990). *Why people obey the law*. New Haven: Yale University Press.

Tyler, T. R. (2006a). *Why people obey the law with a new afterwards by the author*. New Haven: Yale University Press.

Tyler, T. R. (2006b). Psychological perspectives on legitimacy and legitimation. *Annual Review of Psychology*, *57*, 375–400. doi:10.1146/annurev.psych.57.102904.190038

Tyler, T. R., & Lind, E. (1992). A relational model of authority in groups. *Advances in Experimental Social Psychology*, *25*, 115–191. doi:10.1016/S0065-2601(08)60283-X

Ullman, J. B. (2006). Structural equation modeling: Reviewing the basics and moving forward. *Journal of Personality Assessment*, *87*, 35–50. doi:10.1207/s15327752jpa8701_03

Vandenberg, R. J., & Grelle, D. M. (2009). Alternative model specifications in structural equation modeling. In C. E. Lance & R. J. Vandenberg (Eds.), *Statistical and methodological myth and urban legends* (pp. 165–191). New York: Taylor & Francis.

Walton, M. D. (1985). Negotiation of Responsibility: Judgments of blameworthiness in a natural setting. *Developmental Psychology*, *21*, 725–736. doi:10.1037/0012-1649.21.4.725

Watson, M. (2005). Environmental offences: The reality of environmental crime. *Environmental Law Review*, *7*, 190–200. doi:10.1350/enlr.2005.7.3.190

Wenzel, M. (2004a). The social side of sanctions: Personal and social norms as moderators of deterrence. *Law and Human Behavior*, *28*, 547–567. doi:10.1023/B:LAHU.0000046433.57588.71

Wenzel, M. (2004b). An analysis of norm processes in tax compliance. *Journal of Economic Psychology*, *25*, 213–228. doi:10.1016/S0167-4870(02)00168-X

Wenzel, M., & Jobling, P. (2006). Legitimacy of regulatory authorities as a function of inclusive identification and power over ingroups and outgroups. *European Journal of Social Psychology*, *36*, 239–258. doi:10.1002/ejsp.298

Wilson, G. D. (1973). *The psychology of conservatism*. Oxford: Academic Press.

Wilson, J. D. (1986). Re-thinking penalties for corporate environmental offenders: A view of the law reform commission of Canada's sentencing in environmental cases. *McGill Law Journal*, *30*, 315–332.

Zimbardo, P. G., & Boyd, N. (1999). Putting time in perspective: A valid, reliable, individual-differences metric. *Journal of Personality and Social Psychology*, *17*, 1.271–1.288. doi:10.1037/0022-3514.77.6.1271

Received 28 April 2011; revised version received 14 May 2012