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Predicting individual differences in the choice of strategy to compensate for attitude-behaviour inconsistencies in the environmental domain

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ABSTRACT

This research examined how people resolve inconsistencies between their pro-environmental attitudes and their counter-environmental actions. Using the action-based model and self-determination theory, we hypothesized that people use either behaviour modification (BM; e.g., counter-balancing the impact of counter-environmental actions) or cognitive restructuring (CR; e.g., trivializing pro-environmental attitudes) strategies to compensate for such inconsistencies and that the choice of strategy depends on people's levels of autonomous and controlled motivation toward the environment (MTE). Exploratory and confirmatory factor analyses, as well as multi-sample path analyses of self-reported data supported hypotheses. Autonomous MTE was associated with the use of BM and the avoidance of CR strategies both to reduce dissonance and to compensate for counter-environmental actions. Controlled MTE was associated with the use of BM strategies to reduce dissonance but with the use of CR strategies to minimize non-threatening inconsistencies. Implications for the environmental belief-action gap and for environmental sustainability efforts are discussed.

1. Introduction

Canadians are increasingly concerned about the environment (Institute for Social Research, 2007; 2009) but continue to drive to work, to consume large amounts of fresh water resources, and to cram landfills and incinerators with waste (Environment Canada, 2011; Statistics Canada, 2008; 2012). This environmental belief-action gap implies that Canadians are likely to act against their own pro-environmental attitudes on a day-to-day basis (Kollmuss & Agyeman, 2002). This is troubling because the choice of strategy to deal with attitude-behaviour inconsistencies presumably has implications for environmental protection efforts. Resolving the inconsistency by changing or compensating for harmful actions should bolster pro-environmental attitudes and behaviour, which has the potential to alleviate the gap. Conversely, resolving the inconsistency by deprecating pro-environmental attitudes or justifying harmful actions should reinforce counter-environmental behaviour, which may exacerbate the gap. Therefore, there is a need to understand individual differences in the use of inconsistency compensation strategies.

1.1. Inconsistency compensation strategies

According to cognitive dissonance theory (CDT; Festinger, 1957), when people hold two conflicting or dissonant cognitions simultaneously, an aversive intrapersonal state of cognitive dissonance is aroused. The aroused dissonance then motivates them to compensate for the inconsistency in order to reduce the psychological discomfort. CDT distinguishes between two approaches, direct versus indirect, to compensate for aversive attitude-behaviour inconsistencies and reduce dissonance (Leippe & Eisenstadt, 1999).

Direct dissonance reduction or compensation strategies consist of categorically changing or eliminating one of the dissonant cognitions directly responsible for the inconsistency (Festinger, 1957). This consists of reversing the initial attitude position, called attitude change, or eliminating the *physical trace* of the behaviour,

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called behaviour change. Indirect dissonance reduction or compensation strategies consist of distorting or restructuring cognitions that are not directly responsible for the inconsistency. In other words, they involve the use of selective elaboration strategies to minimize the dissonance ratio, which is the total number of relevant dissonant cognitions relative to the total number of all relevant dissonant and consonant cognitions weighted by their perceived importance (Leippe & Eisenstadt, 1999). Selective elaboration consists of removing or minimizing the importance of dissonant cognitions, or of adding or maximizing the importance of consonant cognitions (Festinger, 1957). Indirect compensation strategies include trivialization that consists of minimizing the importance of dissonant attitudes, rationalization that involves justifying the behavioural transgression, and behaviour modification that consists of enacting a compensatory pro-attitudinal action. Inconsistency compensation strategies lie on a continuum of elaboration that require increasingly more self-regulatory resources to implement (Leippe & Eisenstadt, 1999). In order of increasing elaboration, they include passive forgetting (i.e., inaction), attitude change, trivialization, rationalization, behaviour modification, and behaviour change.

In principle, direct compensation strategies are most effective because they directly eliminate the inconsistency. However, in practice, it is reasonable to assume that people are more likely to make gradual versus categorical changes to their attitudes. In fact, most CDT research that uses 'attitude change' as the dependent variable usually reports a weakening of attitudes (i.e., less extreme attitude position) similar to trivialization. Likewise, research that relies on 'behaviour change' outcomes usually operationalizes them as intentions to enact or as the enactment of a new pro-attitudinal action, a strategy similar to behaviour modification. Presumably, this is because actions leave a physical trace which is often difficult or impossible to reverse or eliminate categorically (Festinger, 1957). This suggests that the conceptual distinctions between the compensation strategies identified in the literature may be a methodological artefact due to the pervasive use of dissonance induction paradigms that offer a limited number of strategies to compensate for an experimentally induced inconsistency. For this same reason, dissonance researchers know little about which strategy or strategies people are likely to use to compensate for spontaneous attitude-behaviour inconsistencies encountered in day-to-day life. Specifically, inconsistencies that arise in everyday situations when several compensation strategies are available and people are free to use the strategy they prefer.

Fortunately, the action-based model (Harmon-Jones, Amodio, & Harmon-Jones, 2009) proposes an alternative account of the motivation underlying dissonance phenomena, which facilitates predictions about individual differences in the choice of compensation strategies.

1.2. Motivation to compensate

The action-based model is a contemporary theory of dissonance, which proposes that there are two types of motivation operating during dissonance processes: proximal motivation and distal motivation (Harmon-Jones et al., 2009). Proximal motivation refers to the dissonance aroused by cognitions with opposing or discordant action tendencies that threaten effective action in important life domains. Once aroused, this motivation drives or impels people to use a compensation strategy to avoid or minimize the psychological discomfort. Distal motivation refers to the dominant behavioural commitments or goals elicited by conflicting cognitions. This motivation leads people to engage in compensatory actions that have the potential to fulfil these salient commitments and goals, thereby restoring effective action (Harmon-Jones et al., 2009). Like CDT (Festinger, 1957), the action-based model proposes that the dissonance spontaneously aroused by a perceived inconsistency motivates people to compensate for the inconsistency, but it also advances the novel proposition that the choice of compensation strategy depends, in part, on action tendencies activated or elicited by the inconsistency. Therefore, Harmon-Jones et al. (2009) have argued that individual differences in dominant action tendencies have better predictive power relative to choices between compensation strategies than do differences in the domain's perceived importance (i.e., CDT; Festinger, 1957). However, the action-based model does not theorize about the nature or the source of individual differences in distal motivation.

In the context of the present research, self-determination theory (Deci & Ryan, 2008) was used to operationalize the concept of distal motivation. Self-determination theory is a theory of motivation that allows for clear predictions about the behavioural commitments and goals likely to guide behaviour in a given life domain, such as the environmental protection domain. The theory distinguishes between autonomous and controlled motivations toward the environment (Pelletier, Tuson, Green-Demers, Noels, & Beaton, 1998), which correspond to the manifestation of distinct causality orientations, or action tendencies, in the environmental domain (Deci & Ryan, 1985).

1.2.1. Autonomous motivation

Autonomous motivation toward the environment (MTE) is the manifestation of the innate action tendency to orient toward and interact with the social environment to facilitate organismic integration (Deci & Ryan, 1985). These integrative action tendencies dispose people to act in ways that increase the coherence and consistence of their authentic self-structures (e.g., beliefs, values, attitudes)—that is, facilitate organismic integration—in important life domains (Ryan & Deci, 2004). Therefore, people who exhibit autonomous MTE tend to engage in pro-environmental behaviour because they believe environmental protection is important, because their pro-environmental attitudes and behaviours are integral to their sense of self, or because such behaviour is inherently satisfying (Pelletier et al., 1998). As a result, autonomous MTE is reliably associated with strong, self-relevant pro-environmental attitudes, and with numerous, frequent, and persistent pro-environmental behaviours (see Pelletier, Baxter, & Huta, 2011 for a review).

1.2.2. Controlled motivation

Controlled MTE is the manifestation of the acquired action tendency to orient toward and interact with the social environment to facilitate desirable instrumental outcomes contingent on behaviour, for example to obtain rewards or to avoid punishments (Deci & Ryan, 1985). These contingent action tendencies uphold ego-invested self-structures, such as desires for status and prestige or feelings of self-worth, which are contingent on the approval of others (Ryan & Deci, 2004). People who exhibit controlled MTE might engage in pro-environmental behaviour to obtain a tax rebate or to garner the praise of others, or to avoid getting a municipal fine or being the object of criticism. In line with these propositions, controlled motivation is not reliably associated with strong pro-environmental attitudes or with indicators of pro-environmental behavioural engagement, especially as the level of perceived difficulty of the behaviour increases (see Pelletier et al., 2011 for a review).

The theoretical and empirical distinctions between autonomous and controlled MTE suggest that the two types of distal motivation guide behaviour toward the satisfaction of different behavioural commitments and goals—organismic integration and ego-protection, respectively. Therefore, accounting for individual differences in MTE could facilitate predictions about the use and

choice of inconsistency compensation strategies in the environmental domain.

1.3. Hierarchical action-based model of inconsistency compensation in the environmental domain

In the context of the present research, the action-based model (Harmon-Jones et al., 2009) and self-determination theory (Deci & Ryan, 2008) were used to develop and test a new model, the hierarchical action-based model of inconsistency compensation in the environmental domain (HABICE). The model summarizes hypotheses about individual differences in inconsistency compensation processes in the environmental domain as a function of levels of autonomous and controlled MTE (Pelletier et al., 1998).

1.3.1. Authentic compensation processes

According to self-determination theory, when integrative action tendencies are dominant, the choice of compensation strategy to deal with an attitude-behaviour inconsistency is likely to be consistent and coherent with authentic self-structures, such as self-relevant pro-environmental beliefs and attitudes. This assumption implies that only the use of behaviour modification or change strategies is likely to effectively resolve a perceived attitude-behaviour inconsistency among people who truly value environmental protection, because these strategies have the potential to both reduce dissonance and facilitate organismic integration. In fact, using any other cognitive restructuring strategy would likely exacerbate the threat to organismic integration rather than minimize it. Put differently, inconsistency compensation processes associated with autonomous MTE should favour authentic self-regulation. Therefore, autonomous MTE should be associated with the increased use of behavioural strategies both to minimize the inconsistency and to reduce the aroused dissonance, as well as with the decreased use of cognitive restructuring strategies to avoid exacerbating the inconsistency (see Fig. 1). These authentic compensation processes could account for the strong, reliable relationship between autonomous MTE and pro-environmental behaviour shown in the literature (see Pelletier et al., 2011).

1.3.2. Contingent compensation processes

When ego-protective action tendencies are dominant, the choice of compensation strategy to deal with an attitude-behaviour inconsistency should be contingent on the presence of external sources of motivation that pressure people to act a certain way, such as perceived threats to ego-invested self-structures due to the potentially negative social evaluative reactions of others (Hodgins, 2008). Among people who value the contingencies afforded by environmentally-protective behaviour, using any compensation strategy is likely to be effective when the perceived inconsistency represents a small or negligible threat to ego-invested self-structures; for example, when dissonant actions violate personal expectations of self-consistency (Thibodeau & Aronson, 1992) but do not engender perceived aversive consequences for the ego-invested self (Cooper & Fazio, 1984) because they are private. However, only overt behaviour modification or change strategies—strategies that have the potential to reverse or minimize negative social evaluative reactions—are likely to be effective when dissonant actions are public and the magnitude of the perceived ego-invested self-threat is large.

In other words, inconsistency compensation processes associated with controlled MTE should be contingent on the arousal of dissonance. When a perceived inconsistency does not arouse dissonance, controlled MTE should be associated with the increased use of cognitive restructuring strategies because these strategies are easier to implement than behavioural strategies and because modifying inauthentic pro-environmental attitudes does not engender negative consequences. Conversely, when a perceived inconsistency arouses dissonance, controlled MTE should be associated with the increased use of behaviour modification or change strategies because these are the only strategies that have the potential to counter the negative social evaluative reactions of others and, thus, to minimize the perceived ego-invested self-threat and reduce the aroused dissonance (see Fig. 1). These contingent compensation processes could explain the tenuous relationship between controlled MTE and pro-environmental behaviour reported literature (see Pelletier et al., 2011 for a review).

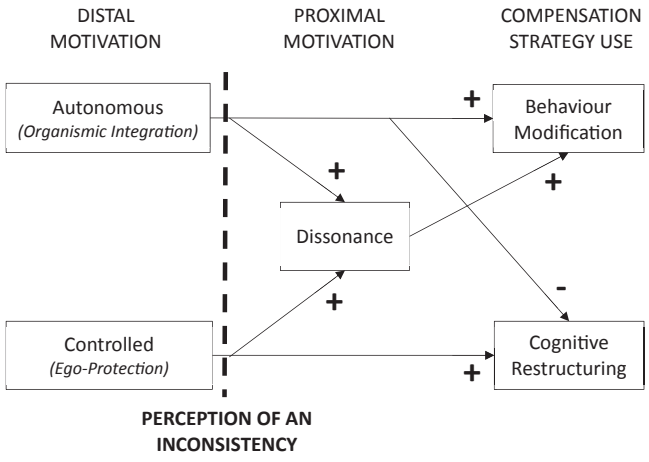

Fig. 1. Diagram depicting the proposed hierarchical action-based model of inconsistency compensation in the environmental domain (HABICE).

1.3.3. Functional significance of compensation strategies

The above predictions imply that the various dissonance reduction strategies proposed by CDT (Festinger, 1957) belong to one of two types depending on their functional significance for the individual (Deci & Ryan, 1985). Among people who truly value environmental protection and exhibit autonomous MTE, the hypothesis refers to a distinction between strategies that facilitate versus impede organismic integration. Specifically, a distinction between authentic behaviour modification or change strategies that uphold self-relevant attitudes versus inauthentic cognitive restructuring strategies that undermine them. Among people who value the contingencies of environmentally protective behaviour and exhibit controlled MTE, the hypothesis refers to a distinction between strategies that are effective at minimizing threatening versus non-threatening inconsistencies. Specifically, a distinction between overt behavioural strategies that could be perceived favourably by important others and could minimize threats to ego-invested self-structures, and covert cognitive restructuring strategies that restore personal expectations of consistency.

1.4. Present research

The main goal of the research was to test the newly elaborated HABICE model (see Fig. 1), which outlines specific hypotheses about the effects of individual differences in distal autonomous and controlled MTE on the choice of strategy to compensate for attitude-behaviour inconsistencies in the environmental domain. A second objective was to test the assumption that individual differences in distal motivation have better predictive power relative to the choice of compensation strategies than do differences in the domain's perceived importance, because distal motives clarify the action tendencies governing compensation processes. The functional significance hypothesis regarding the distinction between

behaviour modification or change and cognitive restructuring compensation strategies was tested by way of exploratory (Study 1) and confirmatory (Study 2) factor analyses, as well as with correlation analyses. Multi-sample path analyses (Study 3) were used to test directional hypotheses between distal motivations—levels of autonomous and controlled MTE—and the use of compensation strategies, as well as to test the generalizability of the HABICE model to the general Canadian population.

2. Study 1

The goal of the first study was to assess the extent to which people used attitude change, trivialization, rationalization, behaviour modification, or behaviour change strategies (versus no strategy) to compensate for a recent counter-environmental action. In theory, these are distinct strategies and fall along a continuum of increasing selective elaboration (Leippe & Eisenstadt, 1999). However, this conceptual distinction does not account the fact that, in practice, attitude change and trivialization, as well as behaviour modification and behaviour change are often confounded. Furthermore, research participants do not usually have free choice among all strategies. By contrast, the HABICE model supports a distinction between behaviour modification or change strategies that facilitate organismic integration and minimize threatening inconsistencies, versus cognitive restructuring strategies that impede organismic integration but minimize non-threatening inconsistencies. Exploratory factor analysis (EFA) was used to identify the number and type of practically significant inconsistency compensation strategies.

2.1. Method

2.1.1. Participants and procedures

Participants were recruited via the Integrated System of Participation in Research (ISPR), which is a pool of undergraduate students used to recruit research participants. After providing informed consent, participants completed the ISPR mass prescreening survey in exchange for course credit. The sample size ($N = 429$)[1] was adequate for the purposes of EFA (Thompson, 2004). The mean age of the sample was 19 years (range: 16–43 years); seven participants (1.1%) declined to answer. The majority of the sample was female ($n = 451$, 70.7%); one participant (.2%) did not report his or her gender.

2.1.2. Measures and scales

The scales used for the present study were embedded within the ISPR mass prescreening survey, which is used by researchers to obtain baseline measurements and select participants who meet inclusion criteria. The items within each scale were presented in randomized order, but the scales were presented in fixed order as follows.

[1] In total, $N = 638$ students completed the ISPR mass prescreening survey; however, 209 of them either did not complete the Recall of a Recent Counter-Attitudinal Action scale or did not describe a counter-environmental action via the scale. Because the planned analyses concern the Inconsistency Compensation Strategies scale, which is predicated on the recall of a counter-environmental action, these participants were excluded from analyses. Compared to participants who recalled a counter-environmental action ($N = 429$; see Table 2), participants who did not recall a counter-environmental action reported less autonomous MTE ($n = 205$, $M = 3.98$, $SD = 1.32$), $t(631) = -4.83$, $p < .001$, 95% confidence interval (CI) [−.72, −.31], Cohen's $d = .38$ and less controlled MTE ($n = 205$, $M = 3.13$, $SD = 1.17$), $t(631) = -2.50$, $p = .01$, 95% CI [−.41, −.05], Cohen's $d = .20$, which supports the idea that these participants were not part of the target population (i.e., people who consider environmental protection important and regulate their actions in that domain). There were no differences in attitude strength or gender ($\alpha = .05$).

2.1.2.1. Motivation toward the environment scale. The Motivation Toward the Environment scale consists of 24 items that answer the question "Why are you doing things for the environment?" The reliability and validity of the scale is supported by previous research (Pelletier et al., 1998; Villacorta, Koestner, & Lekes, 2003). The items form six subscales of four items corresponding to the six regulation styles proposed by self-determination theory including intrinsic regulation, integrated regulation, identified regulation, introjected regulation, external regulation, and non-regulation (i.e., amotivation). Participants indicated the degree of correspondence between each statement and their own reasons for doing things for the environment on a 7-point Likert scale ranging from 1 *does not correspond at all* to 7 *corresponds exactly*. Autonomous motivation scores were computed by taking the mean of the scores based on the intrinsic, integration, and identification subscales. Controlled motivation scores were computed by taking the mean of the scores based on the introjection and external regulation subscales.

2.1.2.2. Recall of a Recent Behavioural Inconsistency task. Participants provided an open-ended response to the following instructions: "Thinking about all of your activities and actions over the past month, please describe an action you did that was inconsistent or contradictory with your environmental beliefs and attitudes." Three examples of counter-environmental actions in the waste diversion, water conservation, and the reduction of greenhouse gas emissions behavioural domains aided participants with this task.

2.1.2.3. Negative affect scale. Participants reported how they felt following the recalled inconsistent action. They responded to six items completing the statement "When I became aware that I acted inconsistently with my own personal beliefs and/or goals about environmental sustainability, I felt …" on a 7-point Likert scale (1 *do not agree* to 7 *completely agree*). The items consisted of adjectives corresponding to negative emotions (e.g., "guilty"). A composite score of negative affect was computed by taking the mean of the six items.

2.1.2.4. Inconsistency compensation strategies scale. An 18-item scale was developed to assess the compensation strategies people used to deal with the recalled transgression. The items completed the statement "When I became aware that I acted inconsistently with my own personal beliefs and/or goals about environmental sustainability, I reacted by …" Responses were measured on a 7-point Likert scale (1 *do not agree* to 7 *completely agree*). The items (see Table 1 for a complete list) represented typical compensation strategies studied by dissonance researchers (based on Leippe & Eisenstadt, 1999). Three social psychologists familiar with CDT reviewed the items. The scale assessed the use of non-compensation strategies, such as inaction or passive forgetting (3 items; e.g., "Putting the inconsistency out of my mind."), as a validity check. It also included items representing the use of compensation strategies, including attitude change or trivialization (5 items; e.g., "Concluding that environmental sustainability is not a priority for me."), rationalization (6 items; e.g., "Thinking it doesn't really matter since most people act the same way."), and behaviour modification or change (4 items; e.g., "Immediately correcting the inconsistent action (ex: repeating the action in a more sustainable fashion.").

2.2. Data analysis

The data were screened for violations of statistical assumptions and analysed with SPSS. First, an EFA was conducted to determine

Table 1
Rotated factor loadings for the exploratory factor analyses (EFA) using principal axis factoring with varimax rotation of the inconsistency compensation scale of Study 1.

Item	Initial EFA			Final EFA		
	CR	BM	R^2	CR	BM	R^2
1. Thinking that the issue of environmental sustainability has been blown out of proportion. [TV]	**.70**	−.06	.49	**.74**	.09	.55
2. Concluding that environmental sustainability is not a priority for me. [TV]	**.65**	−.34	.53	**.74**	−.21	.57
3. Thinking it doesn't really matter since most people act the same way. [RT]	**.63**	−.36	.53	**.67**	−.21	.50
4. Questioning whether environmental sustainability is really that important to me personally. [TV]	**.63**	−.02	.39	**.64**	.02	.39
5. Thinking I cannot be held personally responsible for environmental sustainability. [RT]	**.61**	−.18	.41	**.58**	−.06	.36
6. Thinking that my individual action probably had no measurable impact on the environment. [RT]	**.57**	−.41	.49			
7. Concluding that my action toward the environment is an indication of my true attitudes and beliefs about the environment. [TV]	**.52**	.09	.28			
8. Thinking that the action I just did, despite being unsustainable, was consistent with other values and goals I consider important. [RT]	**.52**	.08	.28			
9. Mentally listing reasons why it wasn't my fault. [RT]	**.52**	−.02	.27			
10. Reassessing the importance I attribute to environmental sustainability. [TV]	.48	.28	.31			
11. Concluding that I could not have acted in any other way under the circumstances. [RT]	.35	−.08	.13			
12. Putting the inconsistency out of my mind. [NC]	.34	−.30	.20			
13. Making changes in my surroundings (ex: placing a recycling bin where there wasn't one) that would allow me or remind me to act more sustainably in the future. [BM]	.12	**.70**	.51	.01	**.75**	.55
14. Immediately correcting the inconsistent action (ex: repeating the action in a more sustainable fashion). [BM]	.04	**.67**	.45	−.04	**.69**	.49
15. Actively looking for opportunities to act sustainably (consistently) in other situations. [BM]	.13	**.61**	.38	−.01	**.56**	.31
16. Doing nothing at all. [NC]	.32	**−.61**	.47			
17. Simply shrugging it off. [NC]	.40	**−.56**	.47			
18. Acting sustainably (consistently) when I found myself in a similar situation at a later time. [BM]	−.13	**.52**	.29	−.22	**.54**	.36
Eigenvalue	5.20	2.85		3.07	2.06	
Proportion of explained variance (%)	28.9	15.8		34.2	22.9	

Note. Results are based on the analyses without multivariate outliers, $n = 388$. CR = cognitive restructuring. BM = behaviour modification. TV = trivialization. RT = rationalization. NC = non-compensation. Rotated factor loadings >.50 are in bolded characters.

the number of distinct types of compensation strategies used to resolve attitude-behaviour inconsistencies in the environmental domain. A parallel analysis of 50 randomly generated data sets was used to determine the number of reliable factors in the data. True factors based on the actual data should have larger eigenvalues than parallel factors derived from random data (Hayton, Allen, & Scarpello, 2004). The number of items was reduced by removing unreliable variables one at a time. Unreliable variables were defined as items that did not load highly on either factor ($\beta < .50$) or that loaded on both factors ($\beta \geq .32$; Thompson, 2004). Finally, mean composite scores based on the extracted factors were correlated with the three composite variables of autonomous and controlled MTE, and negative affect. Partial correlations between the two compensation strategies and the three covariates, controlling for the other two covariates, were also computed.

2.3. Results and discussion

2.3.1. Exploratory factor analysis

The 18 Inconsistency Compensation Strategies scale items had means between 2.44 and 3.99, standard deviations between 1.52 and 1.89, and approximately normal distributions (skewness < |1.00|). About one-third (31%) of the inter-item correlations were substantial ($r \geq .30$; see Table A1) justifying the use of EFA. The use of listwise deletion yielded a sample size of 407 participants (94.9%), which is ample for EFA (Thompson, 2004). There were 19 multivariate outliers (4.7%) based on large Mahalanobis distances ($p < .001$); therefore, the EFA was conducted with and without outliers. The initial analysis of the observed data and the parallel analysis of the 50 randomly generated data sets of 18 variables and 407 cases were conducted with the Principal Axis Factoring extraction method. Though the initial analysis of the observed data produced three eigenvalues larger than 1, the third factor did not have high loading items and only the first two eigenvalues were larger than those based on the randomly generated data. Therefore, two factors were extracted with varimax rotation (factor correlation $r = -.05$).

The results of the initial extraction (see Table 1) supported the functional significance hypothesis. The first factor correlated with trivialization and rationalization items, that is, cognitive restructuring strategies. The second factor correlated with behaviour modification and change items. The non-compensation items loaded on both factors; they correlated positively with the first factor and negatively with the second factor. Unreliable variables were removed one at a time, which led to some of the reliable variables from the initial analysis to become unreliable (i.e., Table 1 Variables 7 to 9); in total, nine variables were removed. The EFA with and without multivariate outliers produced the same pattern of results; however, the magnitude of the factor loadings and extraction communalities (R^2) were slightly larger for the latter analysis (see Table 1 for the results of this analysis). The final two-factor solution included nine trivialization, rationalization, and behaviour modification items; explained 57.1% of the total initial variance in the set of items; and explained at least 30% of the variance in the individual items. In sum, the factor solution was reliable and consistent with the functional significance distinction between cognitive restructuring (CR) and behaviour modification (BM) strategies.

2.3.2. Correlation analyses

Descriptive statistics and bivariate and partial correlations corresponding to the five composite variables, including the three covariates and mean composite scores of CR and BM, are presented in Table 2. Participants were significantly more likely to report using BM versus CR strategies, $t(428) = 14.37$, $p < .001$, 95% CI [−1.52, −1.16], Cohen's $d = 1.39$. In line with CDT and self-determination theory, autonomous and controlled MTE showed positive correlations with negative affect, and the use of CR and BM strategies were negatively correlated. As expected, the use of CR strategies showed a negative correlation with autonomous motivation and a positive correlation with controlled motivation. However, it had a negative relationship with psychological discomfort, which is inconsistent with CDT. The use of BM strategies was positively correlated with levels of autonomous and

Table 2
Descriptive statistics and bivariate and partial correlations of the Study 1 composite variables.

Variable	*n*	*M*	*SD*	Skew	α	Correlations				
						1	2	3	4	5
1. Autonomous MTE	428	4.50	1.23	−.29	.84[a]	—	.46***	.49***	−.30***	.44***
2. Controlled MTE	428	3.36	1.05	−.05	.80[a]		—	.40***	.10*	.23***
3. Negative affect	429	4.05	1.43	−.09	.89			—	−.16**	.45***
4. Cognitive restructuring	429	2.68	1.17	.55	.78	*−.35***	*.30***	*−.07*	—	−.18***
5. Behaviour modification	429	4.02	1.34	−.05	.74	*.28***	*−.04*	*.30***		—

Note. All variables had a potential range of 1–7. Bivariate correlations are above the diagonal. Partial correlations between the compensation strategies (Variables 4 and 5) and each motivation construct (Variables 1 through 3) controlling for the other two motivation constructs are below the diagonal in italics. MTE = motivation toward the environment.
*$p < .05$. **$p < .01$. ***$p < .001$.
[a] Cronbach alpha corresponding to the least internally consistent composite subscale.

controlled MTE, and of psychological discomfort. A pattern more consistent with hypotheses emerged when we correlated CR and BM strategies with each covariate, controlling for the other two covariates. The use of CR strategies showed the same pattern of relationships as before, except that its correlation with psychological discomfort was no longer significant. This finding suggests that people use CR strategies to avoid the inconsistency rather than to reduce dissonance when BM strategies are available. The use of BM strategies still showed a positive relationship with autonomous MTE and psychological discomfort, but a null relationship with controlled MTE as expected. Although CDT distinguishes between several conceptually distinct strategies, the results of the EFA and the pattern of partial correlations seemed to support the existence of two broader categories of compensation strategies, CR and BM, based on their functional significance, as predicted by self-determination theory.

3. Study 2

The goal of the second study was to carry out a confirmatory factor analysis (CFA) of the revised nine-item Inconsistency Compensation Strategies scale developed in Study 1. A two-factor structure that distinguishes between CR and BM strategies was expected. We tested the validity of the functional significance hypothesis by way of correlation analyses. If the functional significance hypothesis holds, the use of CR strategies should be positively associated with controlled MTE and with ego-invested self-protection motives to compensate (ego-protection motives). In addition, the use of these strategies should be negatively associated with pro-environmental attitude strength, autonomous MTE, and authentic self-integrity motives to compensate (self-integrity motives). The use of BM strategies should be positively associated with autonomous MTE, self-integrity motives, and pro-environmental attitude strength, but not with controlled MTE or ego-protection motives. Furthermore, these correlations should persist even when controlling for individual differences shown to influence dissonance processes but that do not account for distal motives. Specifically, we assessed preferences for consistency, which promotes the use of more elaborate compensation strategies (see Guadagno & Cialdini, 2010 for a review); private and public self-consciousness, which seems to dispose people to use more or less elaborate strategies, respectively (Scheier & Carver, 1980); and self-presentation concerns, which predicts greater dissonance-induced attitude change (Paulhus, 1982).

3.1. Method

3.1.1. Participants and procedures

Undergraduate students who completed a mass prescreening survey via the ISPR were invited to participate in the study using a generic description titled "Why do you act the way you do?" After providing informed consent, participants completed an online questionnaire in exchange for course credit. The sample ($N = 257$)[2] was considered sufficiently large to obtain unbiased indices of model fit and parameter estimates using covariance structural modelling (Jackson, 2003). The median age of the sample was 18 years (range: 16–55 years); eight participants (3.1%) did not report their age. The majority of the sample was female ($n = 205$, 79.8%); five participants (1.9%) declined to report their gender.

3.1.2. Measures and scales

Participants completed the Motivation Toward the Environment scale (see Section 2.1.2.1) and the social desirability scale (see below) via the ISPR mass prescreening survey. The remaining measures and scales were administered via an online questionnaire. The items of each scale were presented in randomized order and the scales were presented in the following fixed order.

3.1.2.1. Social desirability scale. A short-form version of the Marlowe-Crowne social desirability scale (Strahan & Gerbasi, 1972; M-C 2(10)) was used. The scale measures the tendency to respond to questionnaire items in culturally sanctioned ways and has been used to operationalize individual differences in self-presentation concerns in previous dissonance research (Paulhus, 1982). The scale consisted of 10 *true* or *false* items. Five items corresponded to socially desirable behaviours and five items corresponded to non-socially desirable behaviours (reverse-scored). A composite score of social desirability bias was computed by taking the sum of socially desirable responses (plausible range: 0 to 10); larger scores indicate a stronger bias.

3.1.2.2. Pro-environmental attitude strength scale. Attitude strength scale items developed for research in other contexts (e.g., Brannon, Tagler, & Eagly, 2007) were adapted to measure favourable attitudes toward environmental protection. Specifically, two items assessed attitude position or extremity relative to two statements: (a) "human activities have a harmful impact on the environment" and (b) "humans need to take action to reduce their harmful impact on the environment." Responses were provided on a 7-point Likert scale (1 *do not agree* to 7 *completely agree*). Six additional items

[2] In total, 339 students participated in the study; however, 82 (24.2%) of them did not complete the recall task as instructed and were excluded from analyses. Compared to participants who were included ($N = 257$; see Table 4), participants who were excluded from analyses reported weaker pro-environmental attitudes ($n = 66$, $M = 3.81$, $SD = 1.05$), $t(321) = -3.65$, $p < .001$, 95% CI [−.80, −.24], Cohen's $d = .41$ and less autonomous MTE ($n = 81$, $M = 3.60$, $SD = 1.34$), $t(331) = -2.45$, $p = .02$, 95% CI [−.72, −.08], Cohen's $d = .27$. There were no differences in controlled MTE, public and private self-consciousness, social desirability, preference for consistency, or gender.

measured other aspects of attitude strength; specifically, knowledge and personal importance of environmental issues, as well as the attitudes' centrality to the self-concept, representativeness of values, level of certainty, and probability of changing (reverse-coded). A composite score of pro-environmental attitude strength was computed by taking the mean of the eight items.

3.1.2.3. Recall of a Recent Behavioural Inconsistency task. Refer to Section 2.1.2.2 for a description.

3.1.2.4. Inconsistency Induced Affect scale. An 18-item affect scale was used to measure levels of psychological discomfort aroused by the recalled behavioural inconsistency. The scale items consisted of adjectives completing the statement "Following the inconsistent action, I felt …" Nine items assessed the target construct of psychological discomfort (based on the conceptualizations proposed by Elliot and Devine (1994) and Stone and Cooper (2001)), including general discomfort (3 items; e.g., "uncomfortable"), dejection-related emotions (3 items; e.g., "disappointed"), and negative self-conscious emotions (3 items; e.g., "guilty"). In addition, the scale featured three anxious emotions (e.g., "agitated") and six positive emotions (i.e., "pleased"). Participants indicated to what extent each adjective corresponded to their emotional response to the inconsistency using a 7-point Likert scale (1 *does not correspond at all* to 7 *corresponds exactly*). A composite score of psychological discomfort was computed by taking the mean of the nine corresponding items.

3.1.2.5. Abbreviated Inconsistency Compensation Strategies scale. An abbreviated version of the Inconsistency Compensation Strategies scale developed in Study 1 was administered. The scale featured the nine items retained for the EFA (see Table 1).

3.1.2.6. Motivation to compensate scale. Participants reported why they compensated for the recalled behavioural inconsistency. They responded to items completing the statement: "I reacted this way following the inconsistent action because … " on a 7-point Likert scale (1 *do not agree* to 7 *completely agree*). The items assessed qualitatively different motives to compensate, including authentic self-integrity restoration motives (3 items; e.g., "I wanted to act in a way that maintains my integrity.") and ego-invested self-protection motives (3 items; e.g., "I wanted to save face.").

3.1.2.7. Brief preference for consistency scale. The brief preference for consistency scale assessed desires to be and to appear consistent (Guadagno & Cialdini, 2010). Participants responded to nine statements (e.g., "I typically prefer to do things the same way") on a 7-point Likert scale (1 *disagree* to 7 *agree*). Previous research supports the reliability and validity of scores based on this scale (Cialdini, Trost, & Newsom, 1995; Guadagno & Cialdini, 2010).

3.1.2.8. Revised self-consciousness scale. The Revised Self-Consciousness Scale (Scheier & Carver, 1985) was used to quantify levels of private self-consciousness (9 items; e.g., "I'm always trying to figure myself out.") and public self-consciousness (7 items; e.g., "I usually worry about making a good impression."). Composite scores were computed by taking the mean of the items of each subscale. Scheier and Carver (1985) have demonstrated that the two subscales are reliable and valid.

3.2. Data analysis

The data were screened for violations of statistical assumptions in SPSS and the CFA was conducted in Mplus (Muthén & Muthén, 2012) using the Full Information Maximum Likelihood method to estimate model fit and parameters from all available data (Schlomer, Bauman, & Card, 2010). The model chi-square statistic tests the exact fit hypothesis; the hypothesis is tenable when the test is not significant ($p > .05$). However, because the exact fit hypothesis is often untenable with large sample sizes ($N > 200$; Kline, 2011), indices of relative fit were also interpreted using cut-offs proposed by Hu and Bentler (1999). Specifically, relative fit was assessed by ensuring a small (close to .06) root mean square of error approximation (RMSEA) statistic and a small upper limit of 90% the confidence interval (close to .08). In addition, the comparative fit index (CFI) and Tucker-Lewis index (TLI) were interpreted. A large statistic (close to .95) indicates relatively good fit. Relatively good fit also results in a small (close to .08) standardized root mean square residual (SRMR). Large modification indices (MI > 5) were also examined to identify areas of model misfit. For the planned correlation analyses, we computed bivariate correlations between all pairs of composite variables, and partial correlations between the mean composite scores of inconsistency compensation strategies and each of the 10 covariates, controlling for the other nine covariates. The covariates refer to mean composite scores of autonomous and controlled MTE, pro-environmental attitude strength, psychological discomfort, self-integrity and ego-protection motives, preference for consistency, private and public self-consciousness, and social desirability.

3.3. Results and discussion

3.3.1. CFA of the Abbreviated Inconsistency Compensation Strategies scale

The nine items from the Abbreviated Inconsistency Compensation Strategies scale had means between 2.59 and 4.20, standard deviations between 1.60 and 2.12, and approximately normal distributions. The CFA was conducted on the covariance matrix (see Table A1) corresponding to the 250 participants who had partial or complete data for the scale. There were eight (3.2%) multivariate outliers; therefore, the CFA was conducted with and without outliers. The measurement model was specified based on the results of the EFA (see Section 2.3.1). The five items corresponding to the CR factor were specified as indicators of one latent variable and the four items corresponding to the BM factor were specified as indicators of a second latent variable. The path of one indicator per latent variable was fixed to 1 and uncorrelated residual error terms were specified for each indicator. The factor correlation was fixed at zero. The uncorrelated factor model fit relatively poorly when tested with multivariate outliers, $\chi^2(27, n = 250) = 74.42$, $p < .001$; RMSEA = .08, 90% CI: [.06, .11]; CFI = .92; TLI = .89; SRMR = .06. However, it fit relatively well when tested without multivariate outliers, $\chi^2(27, n = 242) = 57.20$, $p = .001$; RMSEA = .07, 90% CI [.04, .09]; CFI = .95; TLI = .94; SRMR = .05. Modification indices revealed that model fit could be significantly improved by specifying covariances between the residual variances of pairs of items on either factor. However, none of the modification indices supported cross-loadings across the two factors. Therefore, the model was not modified.

The analyses conducted with and without multivariate outliers yielded the same overall pattern of results. Parameter estimates for the analysis without multivariate outliers are presented in Table 3. All indicators had substantive factor loadings ($\lambda > .50$) on their respective factors and the majority of the items were well-explained by the latent variables ($R^2 \geq .30$); with the exception of one item on the BM factor. Though the BM factor appeared less reliable, the factor structure was theoretically tenable and the items corresponding to both factors were internally consistent (see Table 4). Therefore, composite scores of CR and BM strategies were computed to test the functional significance hypothesis. Descriptive

Table 3
Factor loadings for the confirmatory factor analysis of the Abbreviated Inconsistency Compensation Strategies scale of Study 2.

Item	Factor	Unstandardized λ		Standardized λ	R^2
		Estimate	95% CI		
2	Cognitive restructuring	—	—	.83	.69
4	Cognitive restructuring	.98	[.86, 1.10]	.81	.66
5	Cognitive restructuring	.91	[.76, 1.05]	.68	.46
3	Cognitive restructuring	.91	[.76, 1.07]	.64	.41
1	Cognitive restructuring	.72	[.60, .85]	.62	.39
13	Behaviour modification	1.32	[.92, 1.72]	.73	.53
15	Behaviour modification	1.18	[.83, 1.54]	.65	.42
14	Behaviour modification	.99	[.70, 1.28]	.55	.30
18	Behaviour modification	—	—	.51	.26

Note. Refer to Table 1 for the list of items. The standardized path estimates (λ) were all significant ($p < .001$).
The symbol "—" indicates a fixed path (λ = 1). CI = confidence interval.

Table 4
Descriptive statistics of the Study 2 composite variables.

Variables	*n*	*M*	*SD*	α	Skew
General constructs					
Private self-consciousness	255	1.91	.56	.74	−.18
Public self-consciousness	255	2.09	.66	.83	−.84
Preference for consistency	254	4.35	1.20	.86	−.40
Social desirability	252	5.23	2.04	.56	.09
Environmental constructs					
Autonomous MTE	252	4.00	1.24	.87[a]	−.06
Controlled MTE	252	3.05	.97	.87[a]	−.21
Attitude strength	257	4.34	1.03	.77	.06
Dissonance motivation					
Psychological discomfort	252	3.50	1.50	.92	.17
Self-integrity restoration	248	3.36	1.72	.80	.28
Ego-invested self-protection	248	2.08	1.38	.85	1.21
Compensation strategies					
Cognitive restructuring	250	3.06	1.31	.82	.27
Behaviour modification	249	3.71	1.46	.70	.01

Note. Scores of private and public self-consciousness had a plausible range of 0–3. Scores of social desirability had a plausible range of 0–10. All other variables had a plausible range of 1–7. MTE = motivation toward the environment.
[a] Cronbach alpha corresponding to the least internally consistent composite subscale.

statistics for the 12 composite variables are presented in Table 4. Again, participants were significantly more likely to report using BM versus CR strategies, $t(248) = 5.12$, $p < .001$, 95% CI [−.90, −.40], Cohen's $d = .65$.

3.3.2. Correlation analyses

Bivariate and partial correlations are presented in Table 5. In line with the results of Study 1, autonomous and controlled MTE showed positive correlations with psychological discomfort. These three variables were also positively correlated with pro-environmental attitude strength, which is consistent with CDT and previous research. In line with hypotheses, autonomous MTE also showed a positive relationship with self-integrity motives and a null relationship with ego-protection motives. Controlled MTE showed a positive correlation with ego-protection motives; however, contrary to expectations, its small positive correlation with self-integrity motives was significant. In terms of compensation strategies, the use of CR strategies showed a negative correlation with autonomous MTE, pro-environmental attitude strength, and self-integrity motives, and a positive correlation with ego-protection motives. Contrary to expectations, however, the use of CR strategies showed a null correlation with controlled MTE and psychological discomfort. It also had a positive correlation with social desirability and public self-consciousness, and a null correlation with private self-consciousness and preference for consistency. Finally, we found that the use of BM strategies had positive correlations with all 10 covariates; the positive correlations with controlled MTE and ego-protection motives countered our hypotheses.

The pattern of partial correlations (see Table 5) was more consistent with the functional significance hypothesis. The use of CR strategies showed negative correlations with autonomous MTE and self-integrity motives, and a positive correlation with ego-protection motives. Contrary to expectations, however, the use of CR strategies showed a negative correlation with psychological discomfort and a null correlation with controlled motivation. Conversely, the use of BM strategies showed a positive correlation with autonomous MTE, pro-environmental attitude strength, and self-integrity restoration motives, as expected. However, its positive correlation with preferences for consistency remained significant. This pattern of results supports the idea that BM strategies facilitate organismic integration and satisfies consistency motives. The lack of correlation between the use of BM strategies and psychological discomfort could be due to the shared variance between these two constructs and autonomous motivation, self-integrity restoration motives, and pro-environmental attitude strength.

4. Study 3

The main objective of Study 3 was to test hypotheses about the direct and indirect effects of autonomous and controlled MTE on the use of compensation strategies and, in turn, the frequency of inconsistencies implied by the HABICE model. According to the model (see Fig. 1), autonomous MTE should predict (a) the use of BM strategies to minimize inconsistencies and to reduce dissonance (positive direct and indirect effects), (b) the avoidance of CR strategies that would exacerbate inconsistencies (negative direct effect), and (c) infrequent inconsistencies in general and via the use of compensation strategies (negative direct and indirect effects). Controlled MTE should predict (a) the use of CR strategies to minimize inconsistencies (positive direct effect), (b) the use of BM strategies to reduce dissonance (positive indirect effect), and (c) frequent inconsistencies via the use of CR strategies (positive indirect effect). A secondary objective of the study was to compare the predictive power of the hypothesized predictors of compensation processes based on the HABICE model relative to those derived from CDT. We used multi-sample path analyses to test these hypotheses and to assess the generalizability of the HABICE model to the Canadian population.

4.1. Method

4.1.1. Participants and procedures

Two samples were recruited from different participant management systems using the same generic study description titled "Why do you act the way you do?" After providing informed consent, participants from both samples completed the same online questionnaire. The sample of undergraduate students ($N = 248$)[3] was recruited via the ISPR. They received course credit in exchange for their participation. The median age of the student

[3] In total, 345 students agreed to participate in the study; however, 97 participants (28.1%) did not complete the recall task and were excluded from analyses. Participants who were included ($N = 248$; see Table 6) and excluded ($N = 97$) from analyses reported similar levels of autonomous and controlled MTE, pro-environmental strength, and relative frequency of counter-environmental actions. However, there were more females who recalled ($n = 207$, 83.8%) versus did not recall a counter-environmental action ($n = 66$, 69.5%), $\chi^2(1) = 8.75$, $p = .003$, $\phi = .16$.

Table 5
Bivariate and partial correlations of the Study 2 composite variables.

Variables	1	2	3	4	5	6	7	8	9	10	11	12
Environmental constructs												
1. Autonomous MTE	–	.41***	.34***	.58***	.37***	.10	.21***	.08	.19**	.17**	−.40***	.39***
2. Controlled MTE		–	.13*	.15*	.14*	.30***	.15*	.23***	.26***	−.12	−.01	.15*
3. Attitude strength			–	.30***	.41***	.09	.13*	.02	.09	.17**	−.42***	.34***
Dissonance motivation												
4. Psychological discomfort				–	.47***	.42***	.22***	.16*	.10	−.01	−.11	.44***
5. Self-integrity motives					–	.49***	.21**	.11	.17**	.14*	−.20**	.44***
6. Ego-protection motives[a]						–	.18**	.24***	.24***	−.04	.18**	.27***
General constructs												
7. Private self-consciousness							–	.55***	.24***	−.19**	.07	.14*
8. Public self-consciousness								–	.33***	−.19**	.14*	.13*
9. Preference for consistency									–	.09	−.02	.22***
10. Social desirability										–	−.16*	.15*
Compensation strategies												
11. Cognitive restructuring	*−.22***	*.05*	*−.03*	*−.20***	*−.15**	*.26****	*.12*	*.06*	*−.05*	*.02*	–	−.04
12. Behaviour modification	*.15**	*−.03*	*.24****	*.06*	*.17***	*.02*	*−.05*	*.05*	*.13**	*.08*		–

[a] The variable was log-transformed to correct the skewed distribution.*Note*. Bivariate correlations are above the diagonal. Partial correlations between the two compensation strategies (variables 11 and 12) and each covariate (variables 1 through 10) controlling for the other nine covariates are below the diagonal in italics. MTE = motivation toward the environment.
*$p < .05$. **$p < .01$. ***$p < .001$.

sample was 19 years (range: 17–46 years). The majority of the sample was female ($n = 207$; 83.5%); one participant (.4%) declined to report his or her gender. The sample of general Canadian adults ($N = 301$)[4] was recruited via CrowdFlower, which is a voluntary crowdsourcing service with over five million contributors. They received $1 (CAD) for agreeing to participate in the study. The median age of the general sample was 35 years (range: 16 to 78). The majority of sample was female ($n = 208$, 69.1%).

4.1.2. Measures and scales

Participants completed the Motivation Toward the Environment scale (see Section 2.1.2.1), the Pro-Environmental Attitude Strength scale (see Section 3.1.2.2), the Recall of a Recent Behavioural Inconsistency task (see Section 2.1.2.2), the Inconsistency Induced Affect scale (see Section 3.1.2.4), and the Abbreviated Inconsistency Compensation Strategies scale (see Section 3.1.2.5), in order. Finally, they completed the Frequency of Environmentally-Relevant Actions scale described below.

4.1.2.1. Frequency of recent environmentally relevant actions. An inventory of 18 environmentally relevant actions was used to measure the relative frequency of recent pro-environmental (9 items; e.g., "Purchased local foods") and counter-environmental actions (9 items; e.g., "Took a bath or a long shower (>10 min)"). The featured actions were relevant to water conservation (6 items; e.g., "Turned off the water while brushing teeth"), waste reduction (6 items; e.g., "Used the double-sided option to print/copy on both sides of the page"), and the reduction of greenhouse gas emissions (6 items; e.g., "Used an electric clothes dryer). Participants estimated how often they had engaged in each action over the past month (free recall). Pro-environmental actions (9 items; e.g., "Brought reusable bags when shopping.") were matched with counter-environmental actions (9 items; e.g., "Took plastic bags at the grocery/store check-out (instead of no bags or reusable bags)."). Items were presented in randomized order. The relative frequency of recent counter-environmental actions was obtained by dividing the sum of the 9 counter-environmental items by the sum of all 18 items in the scale.

4.2. Data analysis

Tests of statistical assumptions and independent samples t-tests to assess sample differences were done in SPSS. Multi-sample path analyses were estimated from the covariance matrices (see Table A2) using MPlus with the Full Information Maximum Likelihood estimation method (Muthén & Muthén, 2012; Schlomer et al., 2010). Two competing path models based on CDT and the HABICE model were tested and compared (see Fig. 2). First, the two path models were fitted to the covariance matrix of each sample separately to ensure the hypothesized models were a good fit to the data. Second, we tested invariance hypotheses to assess the generalizability of the two models across the samples (Kline, 2011). We tested the *configural invariance* hypothesis by simultaneously fitting the path models to the covariance matrices of both groups and freely estimating parameters across groups (i.e., equal form model). A non-significant model chi-square ($\alpha = .05$) leads to the retention of the configural invariance hypothesis. We tested the *full invariance* hypothesis by fixing all the paths, variances, covariances, and residual variances, to equality across the two samples (i.e., equal parameter model). The full invariance hypothesis is tenable if the chi-square difference test ($\Delta\chi^2$) is not significant. We examined large modification indices (MI > 5) to identify areas of misfit and adjust the models, as necessary. We used the non-parametric bootstrapping method (1000 samples) to obtain 95% bias-corrected confidence intervals of standardized specific indirect, total indirect, and total effects for the exogenous predictor variables of both models (Shrout & Bolger, 2002). Finally, the CDT and HABICE path models were respecified to allow for a comparison of their respective Bayesian Information Criterion (BIC) values. When two models are estimated from the same covariance matrix, the model with the smallest BIC value is a better fit to the data (Kline, 2011).

[4] In total, 423 Crowdflower contributors agreed to participate. However, we excluded 122 participants (28.8%) from analyses because they did not recall a counter-environmental action. Compared to those who recalled a counter-environmental action ($N = 301$; see Table 6), participants who did not recall a counter-environmental action ($N = 122$) reported weaker pro-environmental attitudes ($n = 108$, $M = 4.19$, $SD = 1.29$), $t(407) = -5.67$, $p < .001$, 95% CI [−.93, −.45], Cohen's $d = .56$ and less autonomous MTE ($n = 108$, $M = 4.62$, $SD = 1.41$), $t(407) = -3.08$, $p = .002$, 95% CI [−.69, −.15], Cohen's $d = .31$. There were no differences in controlled MTE, relative frequency of counter-environmental actions, or gender.

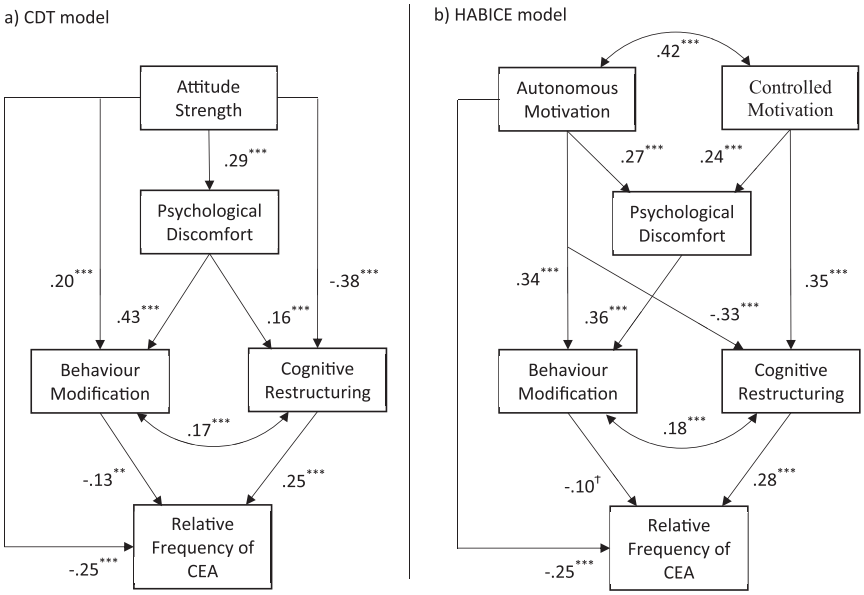

Fig. 2. The multi-sample equal parameter path model diagrams of Study 3. Paths, covariances, variances, and residual variances were constrained to equality across the general ($N = 301$) and student ($N = 248$) samples. Standardized path coefficients (single-headed arrows) and correlations (double-headed arrows) are shown. CDT = cognitive dissonance theory. HABICE = hierarchical action-based model of inconsistency compensation in the environmental domain. CEA = counter-environmental actions. $^{\dagger}p < .10$, $^{*}p < .05$, $^{**}p < .01$, $^{***}p < .001$.

4.3. Results and discussion

4.3.1. Sample differences

The general sample was substantially older than the student sample with a median difference of 16 years. In addition, there was a greater proportion of males in the general sample (30.9%) compared to the student sample (16.2%), $\chi^2(1) = 15.96$, $p < .001$, $\phi = .17$. Descriptive statistics of the composite variables by sample are shown in Table 6. Independent samples t-tests revealed that, compared to the student sample, the general sample reported significantly greater autonomous MTE, $t(547) = -5.42$, $p < .001$, 95% CI [−.75, −.35], Cohen's $d = .46$, and controlled MTE, $t(547) = -4.07$, $p < .001$, 95% CI [−.54, −.19], Cohen's $d = .35$. The general sample also reported stronger pro-environmental attitudes, $t(547) = -4.12$, $p < .001$, 95% CI [−.51, −.18], Cohen's $d = .35$, and a smaller relative frequency of recent counter-environmental actions, $t(532) = 3.01$, $p = .003$, 95% CI [.02, .08], Cohen's $d = .26$. However, there were no significant differences ($\alpha = .05$) in psychological discomfort, or in the use of CR or BM strategies. In sum, there were significant differences demographic and motivational differences across samples.

4.3.2. Multi-sample path analyses

4.3.2.1. CDT path model. The first model tested hypotheses derived from Festinger's (1957) original CDT; specifically, that the choice of inconsistency compensation strategy is determined by the domain's perceived importance (i.e., attitude strength) and the magnitude of dissonance (i.e., psychological discomfort). Disturbance error terms were specified for the four endogenous variables. Initially, the model was specified without a covariance between BM and CR strategies, which fit well within the student sample, $\chi^2(2) = 3.31$, $p = .19$, but fit poorly within the general sample, $\chi^2(2) = 24.58$, $p < .001$. Results for the general sample suggested that model fit could be significantly improved by adding a covariance between the two types of compensation strategies (MI = 23). Because the general sample displayed greater MTE, they may have been more motivated to compensate for inconsistencies and, therefore, more inclined to use a second strategy when initial attempts to compensate for an inconsistency failed (Gotz-Marchand, Gotz, & Irle, 1974). Therefore, a covariance was specified between CR and BM strategies. The modified path model fit well in the student sample, $\chi^2(1) = 3.29$, p = .07, and the general sample, $\chi^2(1) = .19$, p = .66.

Table 6
Descriptive statistics of the Study 3 composite variables by sample.

Variable	General sample					Student sample				
	n	*M*	*SD*	α	Skew	*n*	*M*	*SD*	α	Skew
Autonomous MTE	301	5.04	1.14	.89[a]	−.34	248	4.49	1.23	.88[a]	−.43
Controlled MTE	301	3.83	.97	.84[a]	−.16	248	3.46	1.13	.85[a]	−.04
Attitude strength	301	4.88	1.00	.81	−.07	248	4.54	.96	.73	−.37
Psychological discomfort	285	3.67	1.54	.94	−.03	243	3.44	1.51	.92	.17
Cognitive restructuring	288	2.58	1.31	.87	.50	241	2.78	1.23	.78	.47
Behaviour modification	288	3.58	1.49	.82	−.08	241	3.79	1.41	.75	−.18
RFCEA	294	.38	.02	—	.47	238	.43	.02	—	.16

Note. The relative frequency of counter-environmental actions (RFCEA) variable had a plausible range of 0–1. All other variables had a plausible range of 1–7. MTE = motivation toward the environment.

[a] Cronbach alpha corresponding to the least internally consistent composite subscale.

Next, model invariance hypotheses were tested. The equal form model fit well, $\chi^2(2) = 3.48$, $p = .18$, thereby supporting the configural invariance hypothesis. The equal parameter model was a good fit to the data, $\chi^2(16) = 26.47$, $p = .05$; RMSEA = .05, 90% CI [.01, .08]; CFI = .98; TLI = .97; SRMR = .06, and fit the data as well as the equal form model, $\Delta\chi^2(14) = 22.99$, $p = .06$, thereby supporting the full invariance hypothesis. See Fig. 2a for a diagram of the equal parameter CDT path model with standardized direct effects and covariances. Refer to Table 7 for estimates and 95% bias-corrected bootstrap confidence intervals of the indirect and total effects of pro-environmental attitude strength.

As expected, pro-environmental attitude strength predicted greater psychological discomfort, greater use of BM strategies, lesser use of CR strategies, and relatively infrequent counter-environmental actions (i.e., infrequent inconsistencies) via direct effects. However, because psychological discomfort predicted the use of both types of compensation strategies, the indirect effects of attitude strength on the use of CR and BM strategies were both positive. Despite the inconsistent indirect effects—which suggest that the CDT model did not fully capture the complexity of the relationships between attitude strength, psychological discomfort, and CR (Shrout & Bolger, 2002)—the total effect of attitude strength on CR was negative and significant, in accordance with CDT. In turn, CR strategies predicted frequent inconsistencies, whereas BM strategies predicted infrequent inconsistencies. The negative total indirect effect of attitude strength on the frequency of inconsistencies was primarily due to the specific indirect effect via CR. The CDT model explained 9% of the variance in psychological discomfort, 14% of the variance in the use of CR strategies, 28% of the variance in the use of BM strategies, and about 20% of the variance in the relative frequency of inconsistencies.

4.3.2.2. HABICE path model. The HABICE path model tested an alternative account of individual differences in inconsistency compensation processes based on the action-based model and self-determination theory. Specifically, it tested the idea that autonomous and controlled MTE dispose people to use different strategies to minimize threatening and non-threatening inconsistencies because they embody different action tendencies. Autonomous and controlled MTE were allowed to freely covary, as were CR and BM strategies. Disturbance error terms were specified for the four endogenous variables. The model fit well in the student sample, $\chi^2(4) = 5.44$, $p = .24$, and the general sample, $\chi^2(4) = 5.47$, $p = .24$. The equal form model fit well supporting the configural invariance hypothesis, $\chi^2(8) = 10.91$, $p = .21$. The equal parameter model fit relatively well, $\chi^2(25) = 38.59$, $p = .04$; RMSEA = .04, 90% CI [.01, .07]; CFI = .97; TLI = .97; SRMR = .08, and fit as well as the equal form model, $\Delta\chi^2(17) = 27.68$, $p = .05$, thereby supporting the full invariance hypothesis.

See Fig. 2b for a diagram of the equal parameter HABICE path model with standardized direct effects and covariances. Refer to Table 7 for estimates and 95% bias-corrected bootstrap confidence intervals of the indirect and total effects of autonomous and controlled MTE. As expected, autonomous motivation predicted greater psychological discomfort, greater use of BM strategies both directly and indirectly via psychological discomfort, and lesser use of CR strategies directly. Controlled motivation predicted greater psychological discomfort, greater use of BM strategies indirectly via psychological discomfort, and greater use of CR strategies directly. In turn, the use of CR strategies predicted frequent inconsistencies and BM predicted somewhat infrequent inconsistencies ($p = .05$), as expected. Autonomous MTE predicted infrequent inconsistencies directly and indirectly via the avoidance of CR strategies. Controlled motivation predicted frequent inconsistencies indirectly via the use of CR strategies. The HABICE path model explained twice as much variance in psychological discomfort and one-fifth more variance in the use of BM strategies than the CDT model, but explained identical proportions of variance in the use of CR strategies and the relative frequency of inconsistencies.

4.3.2.3. CDT versus HABICE model comparison. Finally, the CDT and HABICE equal parameter path models were respecified to allow for a comparison of their respective BIC values. Specifically, the autonomous and controlled MTE variables were added to the equal parameter CDT path model described in Section 4.3.2.1, and the pro-environmental attitude strength variable was added to the equal parameter HABICE path model described in Section 4.3.2.2. In both cases, the additional covariate or covariates were specified as exogenous variables and were allowed to freely covary with the other exogenous variables in the model. The variances and covariances corresponding to the new covariates were constrained to equality across the two samples. The results indicated that the HABICE model ($\chi^2(36) = 108.60$, $p < .001$; RMSEA = .09, 90% CI [.07, .10]; CFI = .92; TLI = .91; SRMR = .08; BIC = 11,906) fit the data

Table 7
Indirect and total effects for the predictor variables of the equal parameter multi-sample path models of Study 3.

Effect	CDT model		HABICE model			
	Attitude strength		Autonomous motivation		Controlled motivation	
	Unstd. [95% BCI]	Std.	Unstd. [95% BCI]	Std.	Unstd. [95% BCI]	Std.
Cognitive restructuring						
Indirect total (via PD)	.06 [.03, .10]	.05**				
Total	−.43 [−.53, −.34]	−.33***	−.35 [−.45, −.27]	−.33***	.42 [.32, .51]	.35***
Behaviour modification						
Indirect total (via PD)	.19 [.13, .24]	.13***	.12 [.08, .16]	.10***	.12 [.08, .16]	.09***
Total	.49 [.39, .59]	.33***	.54 [.45, .62]	.44***	.12 [.08, .16]	.09***
Frequency of inconsistencies						
Indirect via CR	−.18 [−.25, −.12]	−.09***	−.14 [−.21, −.10]	−.09***	.17 [.12, .24]	.10***
Indirect via BM	−.05 [−.09, −.02]	−.03*	−.05 [−.10, −.01]	−.03†		
Indirect via PD & CR	.02 [.01, .04]	.01**				
Indirect via PD & BM	−.03 [−.06, −.01]	−.02*	−.01 [−.03, .00]	−.01†	−.01 [−.03, .00]	−.01†
Indirect total	−.23 [−.32, −.15]	−.12***	−.21 [−.30, −.13]	−.13***	.16 [.11, .23]	.09***
Total	−.70 [−.82, −.57]	−.37***	−.59 [−.71, −.47]	−.38***	.16 [.11, .23]	.09***

Note. $N = 549$. CDT = cognitive dissonance theory. HABICE = hierarchical action-based model of inconsistency compensation in the environmental domain. Unstd. = unstandardized estimate. BCI = bias-corrected bootstrap confidence interval. Std. = Standardized estimate. PD = psychological discomfort. CR = cognitive restructuring. BM = behaviour modification.
†$p < .10$. *$p < .05$. **$p < .01$. ***$p < .001$.

better than did the CDT model ($\chi^2(37) = 214.90$, $p < .001$; RMSEA = .13, 90% CI [.12, .15]; CFI = .83; TLI = .80; SRMR = .12; BIC = 12,006), as expected. The modification indices for the respecified HABICE model suggested that attitude strength explained additional variance in CR over and above the variance explained by MTE. However, because the objective of the analysis was to compare the predictive power of the two models rather than to assess their combined predictive power, the respecified model was not modified.

5. General discussion

The goal of this research was to explore individual differences in compensation processes triggered by spontaneous attitude-behaviour inconsistencies encountered in the environmental domain. The results seemed to support the proposed HABICE model (see Fig. 1), which outlines specific hypotheses about why and how individual differences in MTE related to the use and choice of compensation strategies. Central to the model were the ideas that people consider environmental protection important and engage in pro-environmental behaviour for different reasons, and that these reasons determine the functional significance of compensation strategies. Though the results were consistent with Festinger's (1957) original theory, accounting for the distal motives governing compensation processes seemed to have greater predictive power relative to the choice of compensation strategies than the predictors proposed by CDT (i.e., attitude strength). The findings also revealed the motivational mechanisms that are likely driving the environmental belief-action gap and those that have the potential to alleviate the gap.

5.1. Contingent compensation processes drive the environmental belief-action gap

When people accord importance to environmental protection because pro-environmental behaviour affords desirable instrumental outcomes that uphold ego-invested self-structures, CR strategies represent an effective means to compensate for attitude-behaviour inconsistencies that do not threaten these outcomes. This supports the notion that controlled MTE disposes people to monitor and compensate for their environmentally harmful actions only when these actions have the potential to engender aversive consequences (Hodgins, 2008). When actions do not engender potentially aversive consequences, people who exhibit controlled MTE seem inclined to change or to trivialize their pro-environmental attitudes, or to rationalize their counter-environmental actions to avoid the inconsistency or, alternatively, to avoid the arousal of dissonance pre-emptively (De Witt Huberts, Evers, & De Ridder, 2014). When actions engender potentially aversive consequences, they arouse dissonance and motivate these people to compensate using overt BM strategies to minimize the aversive consequences of their actions. In any case, compensation processes guided by controlled MTE are directed at avoiding or minimizing perceived threats rather than at protecting the environment.

Furthermore, the results suggest that the contingent compensation processes associated with high levels of controlled MTE may lead to decreased MTE over time. When people reluctantly compensate for attitude-behaviour inconsistencies to conform to socially sanctioned values or goals about environmental protection, they feel better because they avoided the threat and reduced the aroused dissonance. However, they are not likely to identify with the action because it was caused by external or internal pressures to behave a certain way (i.e., the dissonance; Deci & Ryan, 2008). The implications of using CR strategies are far more dismal. The observation that one freely chose to revise his or her pro-environmental attitudes should lead people to infer they hold weak pro-environmental attitudes (Fazio, Zanna, & Cooper, 1978). Over time, the use of CR strategies could therefore lead to the extinction of pro-environmental attitudes and foster amotivation toward the environment (Pelletier, Dion, Tuson, & Green-Demers, 1999). In sum, the results suggest that controlled MTE likely drives the environmental belief action-gap and favours continued environmental degradation.

5.1.1. Authentic compensation processes alleviate the environmental belief-action gap

Conversely, when people accord importance to pro-environmental attitudes and behaviour because these cognitions are an integral part of authentic self-structures, CR strategies do not represent an effective means to compensate for attitude-behaviour inconsistencies and reduce dissonance. Rather, the use of CR strategies is likely to exacerbate the perceived threat to self-structures because it would create inconsistencies with other important self-structures that are coherent and consistent with pro-environmental attitudes (e.g., health beliefs). Therefore, people with strong, self-relevant pro-environmental attitudes tend to avoid CR strategies altogether. Furthermore, autonomous MTE seems to dispose people to compensate for inconsistencies using effortful BM strategies regardless of whether these inconsistencies arouse dissonance, resulting in fewer inconsistencies in day-to-day life. One plausible explanation is that the autonomous orientation disposes people to detect situations that have the potential to lead to attitude-behaviour inconsistencies and to adjust their actions pre-emptively to avoid them entirely (Hodgins, 2008). In other words, the results suggest that the authentic compensation processes associated with autonomous MTE are directed at resolving the inconsistency by protecting the environment, rather than at merely reducing the aroused dissonance.

Another implication of the research is that these authentic compensation processes promote the internalization of pro-environmental motivation. Presumably, when people successfully resolve attitude-behaviour inconsistencies by acting in accordance with self-relevant pro-environmental attitudes, they identify more strongly with environmental protection goals because their pursuit was self-fulfilling (Deci & Ryan, 2008). A complementary hypothesis is that the authentic use of BM strategies leads people to infer that they hold strong pro-environmental attitudes based on the considerable amount of effort they freely chose to invest to compensate for their counter-environmental actions (Fazio et al., 1978). In any case, the results suggest that autonomous MTE has the potential to alleviate the environmental belief action-gap and favour increased environmental sustainability.

5.2. Limitations and future research

Because the present research was concerned with exploring free choices among compensation strategies in everyday situations, the use of self-report methods was desirable and justified. However, the use of self-report methods also represents the most important limitation of the research. For example, it is impossible to know the exact nature of the psychological discomfort measure. The reported levels of psychological discomfort may reflect the dissonance aroused by the behavioural inconsistency, the dissonance aroused by the recall task itself, or both. Furthermore, if participants successfully reduced the dissonance at the time the inconsistency took place, they may have been unable or unwilling

to recall the dissonance aroused by it. Similarly, people may have been biased when recalling the compensation strategies they used, especially if the recall task aroused dissonance. Any of these confounds could have artificially inflated or deflated the correlations. Therefore, a more thorough test of the HABICE model will require the use of experimental methods to study the role of distal motivation on inconsistency compensation processes as they unfold.

5.3. Conclusion

The same motivational orientations guiding inconsistency compensation processes in the environmental domain likely influence the magnitude of the environmental belief-action gap. On one hand, contingent compensation processes associated with high levels of controlled MTE may lead to weakened pro-environmental attitudes, more frequent inconsistencies, and increased a motivation toward the environment. In other words, offering incentives or disincentives to encourage pro-environmental behaviour appears to exacerbate the environmental belief-action gap. By contrast, authentic compensation processes associated with high levels of autonomous MTE may lead to strengthened pro-environmental attitudes, less frequent inconsistencies, and increased autonomous MTE. Therefore, finding ways to promote autonomous MTE in general and during inconsistency compensation processes in particular could potentially alleviate the gap. That is, there is a need to persuade the population of the self-relevance and inherent value of pro-environmental behaviours, rather than merely emphasizing their economic and social benefits.

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Appendix A. Supplementary data

Supplementary data related to this article can be found at http://dx.doi.org/10.1016/j.jenvp.2015.10.001.

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