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ORIGINAL PAPER

Why are attitude–behaviour inconsistencies uncomfortable? Using motivational theories to explore individual differences in dissonance arousal and motivation to compensate

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Abstract Using cognitive dissonance theories and self-determination theory, we explored the role of individual differences in global and contextual motivational orientations on dissonance arousal processes following spontaneous attitude–behaviour inconsistencies (ABIs). Study 1 ($N = 382$) showed that individual differences in global motivation relate to the frequency of ABIs and dissonance arousal across important life domains. Studies 2 ($N = 282$) and 3 ($N = 202$) showed that individual differences in contextual motivation toward the environment predict the relative frequency of ABIs and the quantity and quality of proximal motivation to compensate for ABIs in that context. Autonomous motivation was associated with a tendency to compensate for ABIs to both reduce dissonance and restore self-integrity. Controlled motivation disposed individuals to reduce dissonance to protect ego-invested self-structures, and to be indifferent to non self-threatening ABIs. Amotivation left people indifferent to ABIs. Individual differences in motivational orientations could explain why ABIs are uncomfortable and motivate people to compensate differently when they face ABIs.

Keywords Cognitive dissonance theory · Action-based model of dissonance · Self-determination theory · Dissonance arousal · Attitude–behaviour consistency

Introduction

Despite having good intentions, everyone occasionally acts in ways contrary to his or her expressed beliefs, intentions, and goals (Glasman and Albarracín 2006). The fact that attitudes do not always translate into consistent actions implies that people are likely to encounter attitude–behaviour inconsistencies (ABIs) in their daily lives. Although ABIs could potentially lead to changes in our attitudes or our behaviour, we know relatively little about their motivational consequences (Newby-Clark et al. 2002). The goal of the present research was to investigate individual motivational differences in dissonance arousal processes following such inconsistencies using cognitive dissonance and self-determination theories of motivation, and the implications that these differences have for the strategies people use to compensate for the inconsistencies they encounter in their daily lives.

Cognitive dissonance theory

According to cognitive dissonance theory (CDT; Festinger 1957), holding two conflicting cognitions simultaneously arouses a state of psychological discomfort (PD) called dissonance that motivates individuals to eliminate or compensate for the inconsistency to reduce the dissonance. The theory states that the quantity of motivation to compensate is directly proportional to the magnitude of aroused dissonance and that the magnitude of dissonance depends on the proportion of dissonant cognitions relative to the

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total number of relevant dissonant and consonant cognitions, weighted by their perceived importance (i.e., the dissonance ratio; Festinger 1957). In sum, CDT posits that the simultaneous accessibility of conflicting cognitions and the perceived importance of domain-relevant cognitions determine the quantity of motivation to compensate for an inconsistency.

Festinger (1957) distinguished between two broad types of compensation strategies: attitude change, which consists of bringing one's attitudes in line with the dissonant action, and behaviour change, which consists of bringing one's behaviour in line with existing attitudes. Because behavioural changes are more difficult to implement and, therefore, require more effort (i.e., motivation and self-regulation) than attitude change (Leippe and Eisenstadt 1999), CDT assumes that people are more likely to change their attitudes versus their behaviour to reduce dissonance but that this tendency reverses as the magnitude of dissonance increases. In practice, however, the direction of attitude change following a dissonance induction and the correlation between levels of dissonance-induced PD and attitude change have proven unreliable across studies (Elliot and Devine 1994; Harmon-Jones 2000).

In other words, CDT research demonstrates low predictive power when it comes to the choice of compensation strategy to reduce dissonance. Researchers have argued that CDT's low predictive power is due, at least in part, to the fact that it does not clearly elucidate why cognitive inconsistencies are uncomfortable; a shortcoming that led Harmon-Jones and colleagues (Harmon-Jones 1999; Harmon-Jones et al. 2009) to propose the action-based model of dissonance.

Action-based model of dissonance

The action-based model of dissonance is a contemporary theory of cognitive dissonance proposed, in part, to resolve the controversy about the motivation driving dissonance effects (Harmon-Jones 1999). The model assumes that most cognitions automatically activate action tendencies, such as beliefs, knowledge, or goals that are useful for behavioural regulation. Dissonance is aroused when the action tendencies implied by one's behaviour conflict with the action tendencies implied by salient relevant attitudes, because the inconsistency threatens effective action in that domain (Harmon-Jones et al. 2009). As a result, people are motivated to compensate for the inconsistency to satisfy action tendencies in a way that restores effective and unconflicted action. In other words, the action-based model distinguishes between the proximal motivation (i.e., dissonance) that impels people to eliminate or compensate for inconsistencies and the distal motivation (i.e., dominant action tendencies) that leads people to choose one or another strategy to satisfy a particular goal or obtain a specific result (Harmon-Jones 1999). Like CDT, the model suggests that the magnitude of dissonance determines the quantity of proximal motivation to compensate, but adds that the dominant action tendencies determine the quality of this motivation.

Individual differences in dissonance processes

Using both the action-based model of dissonance (Harmon-Jones et al. 2009) and self-determination theory (Deci and Ryan 2008) as guiding frameworks, Lavergne and Pelletier (2015) have demonstrated that accounting for individual differences in motivation toward the environment (Pelletier et al. 1998) increases the predictive power of CDT relative to the use and choice of cognitive restructuring (i.e., attitude change) versus behavioural modification (or change) strategies to resolve a recent ABI in the environmental protection domain. Implicit to the hierarchical action-based model of inconsistency compensation in the environmental domain (HABICE) elaborated and tested by these authors is the idea that the different types of motivation operating in a given domain give rise to different motives to compensate for a perceived ABI in that domain. The research by Lavergne and Pelletier (2015) suggests that people do not necessarily compensate for ABIs strictly to reduce the aroused psychological discomfort, as proposed by Festinger's (1957) original theory. It appears that, at times, people compensate to satisfy other proximal motives elicited by the inconsistency and that these motives vary according to the functional significance of the perceived inconsistency.

Because the HABICE is based on the action-based model of dissonance (Harmon-Jones et al. 2009), which explicitly distinguishes between the three components of dissonance processes including the perception of an inconsistency and the arousal and reduction of dissonance, it is possible to apply it to understand individual differences in dissonance arousal processes. Similarly, because the HABICE model is inspired by the hierarchical model of extrinsic and intrinsic motivation (Vallerand 1997), which posits that motivation operates hierarchically at three levels of generality (i.e., global, contextual and situational), the model can be expanded to include global motivation and study dissonance arousal processes across life domains. More importantly, combining these two theoretical frameworks makes it possible to make testable predictions about the quantity and quality proximal motives to compensate.

Hierarchical action-based model of inconsistency compensation

Like the action-based model of dissonance (Harmon-Jones et al. 2009), the HABICE model (Lavergne and Pelletier

2015) begins with the assumption that dissonance is aroused when the action tendencies implied by one's behaviour conflict with the action tendencies implied by attitudes relevant to the behavioural domain, because the inconsistency threatens effective action in that domain. As a result, people are motivated to compensate for the inconsistency in a way that restores effective and unconflicted action and satisfies the behavioural commitments and goals activated by the conflict. Furthermore, the HABICE model uses self-determination theory (Deci and Ryan 2008)—a complementary theory to the action-based model—to define and operationalize individual differences in dominant action tendencies.

Dominant action tendencies

Self-determination theory (SDT; Deci and Ryan 1985, 2008) proposes that all individuals embody three broad motivational orientations—autonomous, controlled, and impersonal—that have implications for behavioural regulation. The autonomous orientation disposes us to act in ways that increase the coherence and consistence of important self-structures, such as beliefs, values, needs, and goals (Ryan and Deci 2004). It promotes self-determined action tendencies that lead people to act authentically relative to these self-structures because it is inherently satisfying to do so (Deci and Ryan 1985).

The controlled orientation disposes us to act in ways that project a favourable impression onto others or oneself in order to facilitate the desired outcomes of the behaviour (e.g., monetary gains, public recognition)—specifically, behavioural outcomes that uphold ego-invested self-structures, such as feelings of self-worth contingent on the approval of others (Hodgins 2008). As such, the controlled orientation promotes non self-determined action tendencies that lead people to act contingently depending on the possible outcomes afforded by the behaviour and their significance for ego-invested self-structures. Finally, the impersonal orientation disposes us to feel as though we have no control over our behaviour or our lives (Deci and Ryan 1985) and does not lead people to regulate behaviour to satisfy specific needs or wants. In other words, it does not promote specific action tendencies.

Top-down effects of distal motivation

Using SDT to operationalize distal motivation allows us to apply the hierarchical model of intrinsic and extrinsic motivation (Vallerand 1997) to make predictions about the top-down effects of motivation at higher levels of generality on motivation at lower levels of generality. According to this model, autonomous and controlled motivation as well as amotivation at the global level of generality exert top-down effects on the contextual motivation operating within specific life domains and, in turn, on the motivation at a specific time for a specific activity. Therefore, motivation at both the global and contextual levels of generality are likely to act as distal motives that create a situational motivational state resulting from dissonance arousal processes.

Global motivation Global motivation corresponds to the manifestation of the autonomous, controlled, and impersonal orientations for activities across life domains (Deci and Ryan 1985; Vallerand 1997). Global motivational orientations are associated with differences in self-focused attention and responses to self-threatening information (Hodgins 2008), which are useful to formulate hypotheses about individual differences in dissonance arousal processes.

Global autonomous motivation is associated with chronic awareness of authentic self-structures and with the deliberate and objective processing of self-threatening information for the purposes of monitoring and maintaining self-integrity (Ryan and Deci 2004). When the autonomy orientation is dominant, people show dampened cardiovascular threat responses to psychological stressors (Hodgins et al. 2010) and decreased cognitive defensiveness (Hodgins et al. 2006). Therefore, global autonomous motivation should be associated with relatively infrequent ABIs across important life domains and should dampen dissonance arousal in response to these inconsistencies to facilitate an adaptive response (i.e., organismic integration).

The controlled motivational orientation is associated with chronic awareness of how others perceive the public aspects of the self and disposes people to attend to private feelings of pressure or tension (Deci and Ryan 1985). In addition, this orientation promotes the reluctant and defensive processing of self-threatening information when there is a perceived threat to ego-invested self-structures (Hodgins 2008). When the controlled orientation is dominant, people tend to exhibit heightened cardiovascular threat responses to psychological stressors (Hodgins et al. 2010) and greater cognitive defensiveness (Hodgins et al. 2006). These findings suggest that global controlled motivation should be associated with relatively frequent ABIs, and should facilitate dissonance arousal in response to inconsistencies in order to energize a defensive response to perceived threats to ego-invested self-structures.

The impersonal orientation disposes people to feel overwhelmed when they attend to self-structures because they lack the resources necessary to effect changes in their behaviour or their environment. Global amotivation disposes people to attend to private feelings of helplessness and anxiety elicited by the potentially negative evaluative reactions of others but not necessarily to use this

information to regulate behaviour (Deci and Ryan 1985; Hodgins et al. 2006). Therefore, global amotivation should be associated with relatively frequent ABIs but it should incite indifference to these inconsistencies because they do not conflict with action tendencies.

In sum, global motivational orientations are useful to understand general dispositions to attend to self-relevant ABIs and to perceive them as self-threatening. However, because motivation at this level of generality does not directly imply the self-relevance of the specific domain threatened by a perceived inconsistency, we expect contextual motivational orientations in the threatened domain to have greater predictive power relative to dissonance arousal constructs.

Contextual motivation At the contextual level of abstraction, motivational orientations should show similar patterns of association with dissonance arousal processes as their global counterparts. However, the top-down influence of contextual motivation on dissonance arousal and proximal motives to compensate should be more important in a specific life domain than the influence of global motivation, in part because contextual motivational orientations reflect the domain's self-relevance (Deci and Ryan 2008; Vallerand 1997). Furthermore, the top-down effects of contextual motivation should yield predictable differences in the quantity and quality of proximal motivation to compensate for an ABI in a given life domain.

Autonomous motivation High levels of contextual autonomous motivation indicate that behaviour in that domain or the domain itself is self-relevant, and favour attitudinally-consistent behaviour (Koestner et al. 1992). For example, contextual autonomous motivation toward the environment is reliably associated with strong and stable favourable attitudes toward environmental protection and frequent pro-environmental behaviour (Lavergne et al. 2010; Pelletier et al. 1998). Therefore, contextual autonomous motivation, like global autonomous motivation, should dispose people to encounter relatively infrequent ABIs in the corresponding life domain.

However, because contextual autonomous motivation reflects the degree of integration of contextual cognitions (e.g., beliefs, attitudes, goals) within the self, a conflict between authentic self-structures and counter-attitudinal actions should elicit a greater proportion of important cognitions that are coherent with the self-relevant attitude than important cognitions that are coherent with the counter-attitudinal action (Ryan and Deci 2004). Therefore, contextual autonomous motivation should motivate people to compensate whenever they become aware of their own counter-attitudinal actions. However, when the autonomous orientation is dominant, people should shift their attention away from the threat and toward ways to convert the threat into an opportunity to facilitate organismic integration (Hodgins 2008). In other words, contextual autonomous motivation should motivate people to compensate for inconsistencies both to reduce dissonance and to restore self-integrity.

Controlled motivation High levels of contextual controlled motivation are indicative of the instrumental value of behaviour in that domain, and promote contingent regulation, which does not necessarily lead to attitudinally-consistent behaviour (Koestner et al. 1992). For example, contextual controlled motivation toward the environment is not reliably associated with pro-environmental attitudes or behaviour (Lavergne et al. 2010; Pelletier et al. 1998). Like global controlled motivation, contextual controlled motivation should dispose people to encounter relatively frequent ABIs in the corresponding life domain.

However, contextual controlled motivation should have different effects on the quantity and quality of proximal motivation to compensate across situations, depending on whether or not perceived inconsistencies threaten instrumental outcomes. Counter-attitudinal actions that violate social norms or expectations and occur in the public realm should represent a threat to instrumental outcomes when the control orientation is dominant (Hodgins 2008). Under these conditions, the importance of cognitions that are coherent with the violated social norm should outweigh the importance of cognitions that are coherent with the counter-normative action. As a result, the ABI should arouse dissonance and motivate people to compensate for the inconsistency in order to protect ego-invested self-structures. Conversely, when counter-normative actions are private and the control orientation is dominant, the importance of cognitions that are coherent with the counter-normative action should outweigh the importance of cognitions that are coherent with the violated social norm. When this is the case, the perceived ABI would not arouse dissonance or motivate people to compensate.

Amotivation High levels of contextual amotivation indicate that behaviour in that domain or the domain itself is not self-relevant, and do not promote behavioural regulation relative to attitudes. For example, amotivation toward the environment is associated with very weak favourable attitudes toward environmental protection and infrequent self-reported pro-environmental behaviour (Lavergne et al. 2010; Pelletier et al. 1998). Therefore, contextual amotivation, like global amotivation, should dispose people to encounter frequent ABIs in the corresponding life domain but these inconsistencies should not arouse dissonance or motivate people to compensate.

Present research

The goal of this research was to investigate the role of distal motivation on dissonance arousal processes triggered by spontaneous ABIs and, in so doing, test predictions derived from the HABICE (Lavergne and Pelletier 2015). The research consisted of three studies. The objective of Study 1 was to test hypotheses about the role of global motivational orientations on the frequency of ABIs and of dissonance arousal across important life domains using correlation analyses. Study 2 was conducted to test hypotheses about the relative frequency of ABIs and the arousal of dissonance in a specific life domain (i.e., environmental protection) as a function of individual differences in global and contextual motivation. The objective of Study 3 was to test hypotheses regarding individual differences in the quantity and quality of motivation to compensate for an inconsistency as a function of contextual motivational orientations. Studies 2 and 3 also compared predictions based on the HABICE with those based on CDT to test the assumption that accounting for distal motivation increases the predictive power of CDT using path analyses.

Study 1

The first study sought to test hypotheses about the relationships between global motivational orientations and dissonance arousal across four life domains, including obesity prevention (i.e., weight management), financial independence (i.e., economic prosperity), racial acceptance, and environmental protection. We hypothesized that global autonomous motivation would be associated with infrequent ABIs due, in part, to chronic awareness of the covert or internal aspects of the self (i.e., greater levels of private self-consciousness), and with infrequent dissonance arousal when such inconsistencies arise to promote an adaptive response that facilitates organismic integration. Global controlled motivation should favour relatively frequent ABIs due, in part, to chronic awareness of the overt or external aspects of the self (i.e., greater levels of public self-consciousness), and frequent dissonance arousal when such inconsistencies arise to energize compensatory efforts that facilitate desired outcomes. Finally, global amotivation should be associated with frequent ABIs and a lack of chronic self-awareness, but with indifference when they arise.

Method

Participants

Study participants were recruited via a research participant pool of undergraduate students enrolled in an introductory psychology course at a bilingual Canadian university (English and French). Participants provided informed consent before completing the online survey in exchange for course credit. In total, 599 undergraduate students completed the survey. However, 217 participants (36.2 %) indicated that some of the life domains under study were not personally important or did not indicate whether or not the domains were important (no response). Therefore, we excluded these participants from analyses.[1] The mean age of the sample ($N = 382$) was 20 years (range 17–46 years). The majority of the sample was female (69.6 %). Participants reported English (44.0 %), French (33.5 %), or another language (19.6 %) as their first language learned; a few (2.9 %) declined to answer.

Instruments

We administered the instruments in English and French (as per the requirements of the Research Ethics Board) with both versions of the items presented side-by-side in the following order.

Global motivation scale Global motivational orientations were assessed using an 18-item version of the global motivation scale (Pelletier and Dion 2007; Sharp et al. 2003). The scale features six subscales of three items that assess the motivational sub-types defined by SDT (Deci and Ryan 2008). Participants were asked to indicate the extent to which each item—completing the stem "In general, I do things…"—corresponded to their own motives for performing daily activities using a 7-point Likert scale (1 does not correspond at all, 7 corresponds exactly). The items measured intrinsic regulation (e.g., "because I like making interesting discoveries"), integration (e.g., "because by doing them I am fully expressing my deepest values"), identification (e.g., "in order to help myself become the person I aim to be"), introjection (e.g., "because otherwise I would feel guilty for not doing them"), external regulation (e.g., "in order to attain prestige"), and non-regulation (amotivation; e.g., "although it does not make a difference whether I do them or not"). A series of empirical studies supports the reliability and validity of the multi-dimensional scale (Sharp et al. 2003). The six subscales showed a simplex-like pattern of correlations, therefore we computed mean composite scores of autonomous motivation using the intrinsic, integration, and identification subscale items ($\alpha = .84$), controlled motivation from the introjection and external regulation

[1] Excluded participants ($n = 217$) reported similar levels of global motivation and self-consciousness as included participants ($n = 382$; see Table 1), and there were no differences in gender or first language composition across the two groups ($\alpha = .05$).

Table 1 Descriptive statistics and intercorrelations of the Study 1 variables

Variable	*n*	*M*	*SD*	Skew	Correlations									
					2	3	4	5	6	7	8	9	10	11
Global motivation														
1. Autonomous	382	4.88	0.88	−0.17	.35***	.06	.21***	.05	.02	−.07	−.09	−.10*	−.14**	.03
2. Controlled	382	4.03	1.09	−0.11	–	.34***	.17**	.40***	.26***	−.09	.15**	.08	.00	.12*
3. Amotivation	382	2.92	1.07	0.11		–	.02	.15**	.13**	.08	.11*	.03	.01	.13*
Self-consciousness														
4. Private	382	1.81	0.49	−0.02			–	.46***	.18***	−.05	.08	.05	−.03	.05
5. Public	382	1.95	0.58	−0.34				–	.22***	−.07	.15**	.15**	.04	.09
Affect														
6. Negative	381	4.20	1.24	−0.26					–	−.43***	.20***	.10	.04	.05
7. Indifference	379	3.44	1.53	0.19						–	−.05	.00	.05	.04
fABIs by domain														
8. Weight management	382	4.30	1.58	−0.14							–	.27***	.26***	.27***
9. Economic prosperity	382	4.11	1.52	0.05								–	.22***	.30***
10. Racial tolerance	382	3.16	1.62	0.44									–	.20***
11. Environmental protection	382	3.73	1.37	0.10										–

The correlations between variables 1 through 6 are Pearson coefficients and the remaining correlations are Spearman's rho coefficients

fABIs frequency of attitude–behaviour inconsistencies

* $p < .05$; ** $p < .01$; *** $p < .001$

subscale items ($\alpha = .79$), and amotivation (i.e., non-regulation subscale score; $\alpha = .71$).

Revised self-consciousness scale Trait levels of private self-consciousness (nine items; e.g., "I'm always trying to figure myself out."; $\alpha = .71$) and public self-consciousness (seven items; e.g., "I usually worry about making a good impression."; $\alpha = .80$) were assessed using the Revised Self-Consciousness scale (Scheier and Carver 1985). We did not include the social anxiety subscale (six items). Items were measured on a four-point Likert scale ranging from 0 (not like me at all) to 3 (a lot like me). The scale has been shown to be reliable and valid (Pelletier and Vallerand 1990; Scheier and Carver 1985).

Frequency of attitude–behaviour inconsistencies scale We developed a four-item scale to assess the frequency of spontaneous ABIs across life domains. Participants responded to the following four scenarios:

> "Many people value and wish to achieve/maintain [a specific body weight/economic prosperity/racial tolerance/an environmentally sustainable lifestyle], however, they sometimes act in ways that are inconsistent with these values and goals (e.g., [wanting to lose weight but skipping a workout or eating too many sweets/wanting to set money aside but splurging on expensive things or unplanned expenses/wanting to be tolerant of people of different races but laughing at a racially discriminating joke/wanting to reduce their greenhouse gas emissions but taking their car when they could have walked, biked, or taken public transit]). In everyday life, how often do you detect inconsistencies between your personal attitudes, beliefs, and goals about your [body weight/economic prosperity/racial tolerance/environmental sustainability] and your actions?"

Participants could indicate the domain was not personally important by selecting the "N/A" response option, or respond to the scenarios on a 7-point frequency scale (1 never, 7 often).

Frequency of negative affect scale We assessed the frequency of experiencing negative affect and indifference following the perception of ABIs using a five-item scale. Participants answered the question: "Generally, when you detect an inconsistency between your personal values or goals and your actual behaviours, how often do you feel _____?" The items were four negative emotions (i.e., "guilty," "insincere," "hypocritical," and "bad about yourself"), and indifference (i.e., "no different than usual"). Participants responded on a 7-point frequency scale (1 never, 7 always). A mean composite score of negative affect was computed ($\alpha = .82$).

Data analysis

We conducted all analyses in SPSS version 21.0. Preliminary analyses were conducted to detect significant differences based on gender and first language ($\alpha = .001$; no differences were found) and to ensure the assumptions of correlation analysis were satisfied. We transformed variables to correct severely skewed distributions (skewness >1) and recoded extreme scores ($z > 3.29$) to minimize the impact of outliers on the mean, as necessary (Tabachnick and Fidell 2006). For the planned correlation analyses, we computed two-tailed Pearson correlation coefficients between all pairs of composite (continuous) variables (Table 1, Variables 1–6) and Spearman Rho correlation coefficients between all other pairs of variables. We used an alpha level of .05 to interpret significant effects.

Results

Descriptive statistics and correlations are shown in Table 1. On average, participants reported that they sometimes become aware of inconsistencies between their attitudes and behaviour in important life domains and that these types of inconsistencies sometimes arouse negative affect. The correlations show that autonomous motivation was associated with greater private self-consciousness and infrequent ABIs in the economic prosperity and racial tolerance domains, but not with the frequency of negative affect, indifference, or ABIs in the other two domains. Controlled motivation was associated with greater private and public self-consciousness, and amotivation was associated with greater public self-consciousness. In addition, controlled motivation and amotivation were associated with frequent negative affect and ABIs in the weight management and environmental protection domains, but not with the frequency of indifference or of ABIs in the other two domains.

Discussion

The observed pattern of correlations suggests a trend whereby global autonomous motivation dampened dissonance arousal, global controlled motivation facilitated dissonance arousal, and global amotivation produced indifference in response to ABIs across important life domains, which lends partial support for our hypotheses. However, the effects of motivation on the frequency of ABIs across life domains were not fully consistent with our hypotheses and the magnitude of the correlations was small. Furthermore, we assumed that the four domains were personally important if participants provided responses to the frequency of ABIs scale, but we did not actually measure levels of perceived importance. Therefore, the objective of Study 2 was to address these limitations by focusing on dissonance arousal processes relative to a single recent ABI in a given life domain.

Study 2

Study 2 focused on the environmental protection domain in order to test hypotheses about the role of distal motivation, at the global and contextual levels, on dissonance arousal processes. We assumed that focusing on a single life domain would also facilitate the comparison of the antecedents of dissonance arousal proposed by CDT—that is, the domain's perceived importance and the cognitive accessibility of conflicting cognitions (Festinger 1957)—with those proposed by the HABICE, namely levels of autonomous and controlled motivation and of amotivation toward the environment (Lavergne and Pelletier 2015). Our hypothesis was that the HABICE predictors, particularly levels of contextual motivation, would supersede the predictive power of the CDT predictors.

We chose to focus on the environmental protection domain because ABIs in this domain were correlated with both controlled motivation and amotivation in Study 1, and contribute to the 'environmental belief-action gap', which undermines environmental sustainability efforts (Kollmuss and Agyeman 2002). Therefore, society has much to gain from understanding the motivational processes underlying inconsistency compensation in the environmental domain.

Method

Participants

Participants were recruited via the same participant pool described in Study 1. Undergraduate students who completed the mass prescreening survey in exchange for course credit could sign up for the present online study titled "Why do you act the way you do?" Participants received an additional course credit for their participation. In total, 339 undergraduate students participated in the study. However, 57 participants (16.8 %) did not recall a recent counter-environmental action on the Recall a Recent ABI scale (see below) and were excluded from analyses.[2] The mean age of the sample ($N = 282$) was 19 years (range 17–36 years). The majority of the sample was female

[2] Compared to participants who were included in analyses ($n = 282$; see Table 2), participants who were excluded from analyses ($n = 57$, $M = 4.25$, $SD = 1.09$) reported weaker pro-environmental attitudes, $t(337) = -2.55$, $p = .01$, 95 % CI [−.68, −.09], $d = 0.28$. There were no group differences on scores of global or contextual motivation, self-consciousness, or the relative frequency of counter-environmental actions, or in gender or first language composition ($\alpha = .05$).

Table 2 Descriptive statistics and intercorrelations of the Study 2 variables

Variable	*n*	*M*	*SD*	Skew	Correlations									
					2	3	4	5	6	7	8	9	10	11
Global motivation														
1. Autonomous	280	4.98	0.80	−0.08	.25***	−.13*	.35***	.09	−.07	.27***	−.08	.15*	.06	−.15*
2. Controlled	280	4.14	1.05	0.05	–	.29***	.05	.39***	.16**	.11	.28***	.02	.09	.11
3. Amotivation	280	2.80	1.05	0.18		–	−.03	.17**	.25***	−.01	.08	−.07	.04	.12*
Contextual motivation														
4. Autonomous	280	4.33	1.21	−0.16			–	.36***	−.45***	.08	−.06	.66***	.28***	−.45***
5. Controlled	280	3.28	0.96	0.11				–	.15*	.02	.15*	.24***	.27***	−.06
6. Amotivation	280	2.47	1.29	1.00					–	−.04	−.01	−.34***	−.09	.40***
Self-consciousness														
7. Private	270	1.96	0.58	−0.29						–	.27***	.04	.13*	.02
8. Public	270	2.07	0.60	−0.45							–	−.04	.07	.11
Dissonance constructs														
9. Attitude strength	282	4.64	1.03	−0.01								–	.23***	−.46***
10. Psychological discomfort	268	3.64	1.55	0.13									–	−.14*
11. Relative frequency of CEA	270	0.42	0.18	0.31										–

Pearson correlation coefficients are shown

* $p < .05$; ** $p < .01$; *** $p < .001$

(78.0 %). Participants reported that their first language was English (52.4 %), French (29.8 %), or another language (16.3 %), or did not respond (1.4 %).

Instruments

Participants completed the Global Motivation scale followed by the Motivation Toward the Environment scale as part of the research participant pool's mass prescreening survey, which featured several psychological measurement instruments used by various researchers to select participants for research studies. We used the Global Motivation scale (see Study 1 for a description) to compute mean composite scores of autonomous motivation ($\alpha = .81$), controlled motivation ($\alpha = .77$), and amotivation ($\alpha = .71$); a simplex-like pattern of correlations between the subscales was supported. We administered the remaining scales via a second online survey designed specifically for this study. The Revised Self-Consciousness scale (see Study 1 for a description), which was administered last, was used to compute mean composite scores of private ($\alpha = .78$) and public ($\alpha = .79$) self-consciousness.

Participants provided written informed consent before completing the surveys. Each page of the latter survey bore the instructions "There are no right or wrong answers to these questions. Please answer as HONESTLY as possible." The scales were presented in fixed order and the English and French versions of the scale items (presented in randomized order) were shown side-by-side.

Motivation toward the environment scale Contextual motivational orientations were assessed using the previously validated Motivation Toward the Environment scale (Pelletier et al. 1997; Pelletier et al. 1998). The scale consists of 24 items that answer the question "Why are you doing things for the environment?" The items form six subscales of four items corresponding to the regulation styles proposed by SDT: intrinsic regulation (e.g., "For the pleasure I experience when I find new ways to improve the quality of the environment."), integration (e.g., "Because taking care of the environment is an integral part of my life."), identification (e.g., "Because it is a reasonable thing to do to help the environment."), introjection (e.g., "Because I would feel guilty if I didn't."), external regulation (e.g., "For the recognition I get from others."), and non-regulation (amotivation; e.g., "I don't really know; I can't see what I'm getting out of it."). Participants responded on a 7-point Likert scale (1 does not correspond at all, 7 corresponds exactly). The subscale composite scores showed a simplex-like pattern of intercorrelations,

therefore we computed mean composite scores of autonomous motivation (i.e., intrinsic, integration, and identification subscale items; $\alpha = .94$), controlled motivation (i.e., introjection and external regulation subscale scores; $\alpha = .79$), and amotivation (i.e., non-regulation subscale score; $\alpha = .86$).

Pro-environmental attitude strength scale A scale based on attitude strength scales used in previous research (e.g., Brannon et al. 2007) was developed to measure the strength of favourable attitudes toward environmental protection. Two items assessed pro-environmental attitude position relative to the 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." Participants responded on a 7-point Likert scale (1 do not agree, 7 completely agree). Six additional items measured other aspects of attitude strength; specifically, the amount of knowledge about environmental issues, the personal importance of environmental issues, the attitude's centrality relative to one's self-concept, the attitude's representativeness of values, the attitude's certainty, and the likelihood of changing the attitude (reverse-coded). Participants responded to these items on a 7-point Likert scale (1 not at all, 7 very much). We computed a composite score of pro-environmental attitude strength by taking the mean of the eight items (c.f., Brannon et al. 2007; $\alpha = .71$).

Recall of a recent attitude–behaviour inconsistency task Next, we asked participants to recall and describe a recent ABI in the environmental domain (c.f., Lavergne and Pelletier 2015). Participants read the same examples of ABIs provided with the frequency of ABIs scale used in Study 1 and provided an open-ended answer 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." We asked participants to keep the recalled transgression in mind when answering the rest of the questionnaire.

Inconsistency induced affect scale Participants reported how they felt following the recalled inconsistency using an 18-item scale developed by Lavergne and Pelletier (2015). Specifically, they responded to items completing the statement "Following the inconsistent action, I felt…" on a 7-point Likert scale (1 does not correspond at all, 7 corresponds exactly). The target construct of psychological discomfort was assessed by computing a mean composite score based on nine items ($\alpha = .92$) from the scale, including the adjectives corresponding to dissonance emotions (3 items; e.g., "uncomfortable"; Elliot and Devine 1994), self-conscious negative emotions (e.g., "hypocritical"), and dejection-related emotions (e.g., "disappointed").

Frequency of recent environmentally-relevant actions scale Finally, participants reported the frequency of 18 recent pro-environmental and counter-environmental actions. Participants responded to the statement: "Thinking about all of your activities and actions over the past week/7 days, please estimate how many times you've performed the following actions." Response options were restricted to integers between 0 and 20.[3] The featured actions were related 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). Pro-environmental actions (nine items; e.g., "Brought reusable bags when shopping") were matched with counter-environmental actions (nine items; e.g., "Took plastic bags at the grocery/store check-out (instead of no bags or reusable bags)."). We calculated a ratio of the relative frequency of counter-environmental actions by dividing the sum of the 9 counter-environmental items by the sum of all 18 items in the scale (c.f., Lavergne and Pelletier 2015).

Data analysis

The preliminary and planned correlation analyses were the same as those described in Study 1. In addition, we conducted path analyses to compare the predictive power of the CDT predictors with that of the HABICE predictors. We used the Full Information Maximum Likelihood Robust method in Mplus (Muthén and Muthén 2012) to estimate model parameters from all available data (Schlomer et al. 2010) in the covariance matrix (see Appendix A in Supplementary materials). In all cases, we specified covariances between all the exogenous variables (i.e., predictors) and the two endogenous variables (i.e., outcomes) in the model to partial shared variance. We ensured the assumptions of covariance structural modeling were satisfied (Tabachnick and Fidell 2006) and assessed the exact fit of the path models by examining the scaled model Chi square statistic (Satorra and Bentler 1994). A significant model Chi square statistic ($\alpha = .05$) leads to the rejection of the exact fit hypothesis.

[3] The intended scale was 0–21 to allow for frequencies of up to three times per day. However, due to a typo, the actual scale was 0–20. Because we computed a ratio score, we assumed the error had a negligible impact on the reliability of the scores.

Results

All the recalled transgressions related to the behavioural domains provided during the Recall of a Recent ABI task—that is, water conservation, waste diversion, or the reduction of greenhouse gas emissions. Descriptive statistics of the study variables are presented in Table 2. Participants reported moderate levels of pro-environmental attitude strength and PD, and relatively infrequent counter-environmental actions (CEA).

Correlation analyses

The pattern of correlations (see Table 2) between the global and contextual motivation variables was consistent with the hierarchical model of extrinsic and intrinsic motivation (Vallerand 1997). Motivational orientations at the global level of generality correlated positively with corresponding orientations at the contextual level, there were also weaker positive associations between controlled motivation and amotivation across levels of generality. Furthermore, the global motivational orientations showed stronger associations with levels of trait self-consciousness than did the contextual motivational orientations. Autonomous motivation was associated with greater private self-consciousness at the global level only, whereas controlled motivation was associated with greater public-self-consciousness at both levels of generality. Amotivation did not relate to self-consciousness. As expected, correlations between global motivational orientations and the two domain-specific constructs, although in the hypothesized direction, were small, and those with psychological discomfort were null. Autonomous motivation was positively associated with attitude strength and negatively associated with the relative frequency of CEA, and amotivation was positively associated with the relative frequency of CEA.

By contrast, the contextual motivational orientations were largely unrelated to levels of self-consciousness—except for the significant positive correlation between controlled motivation and public self-consciousness—and more strongly associated with domain-specific and dissonance constructs, as expected. Contextual autonomous motivation was associated with stronger pro-environmental attitudes, greater PD, and relatively infrequent CEA. Contextual controlled motivation showed a positive association with attitude strength and psychological discomfort, but no association with the relative frequency of CEA. Finally, contextual amotivation was unrelated to PD and associated with weaker pro-environmental attitudes and relatively frequent CEA. Finally, attitude strength was associated with relatively infrequent CEA and greater PD as predicted by CDT, and the relative frequency of CEA was associated with less PD. The overall pattern of correlations replicates previous research based on the HABICE model (Lavergne and Pelletier 2015) and suggests that the distal motivation guiding dissonance arousal processes resides primarily at the contextual level of generality.

Path analyses

In order to compare the predictors of ABIs (relative frequency of CEA) and of dissonance arousal (PD) implied by CDT to those proposed by the HABICE, we conducted path analyses. The CDT path model (see Fig. 1a) tested the assumption that the frequency of ABIs decreases and the magnitude of dissonance increases as the domain's personal importance (attitude strength) increases (Festinger 1957),[4] and that chronic awareness of the public aspects of the self (public self-consciousness) favours more frequent ABIs whereas chronic awareness of private attitudes and beliefs (private self-consciousness) leads individuals to experience greater dissonance arousal (Scheier and Carver 1980). The model fit well, $\chi^2(2) = 0.78$, $p = .68$. The hypothesized effects were supported by the results (see Fig. 1a for the parameter estimates), except for the effect of public self-consciousness on the relative frequency of CEA, which was positive but non-significant ($p = .11$). The model explained 7 % of the variance in PD and 22 % of the variance in the relative frequency of CEA.

The HABICE path model (see Fig. 1b) tested the hypothesis that contextual autonomous and controlled motivations toward the environment predict a greater magnitude of dissonance, and that autonomous motivation predicts infrequent whereas amotivation predicts frequent ABIs. The three exogenous variables and the two endogenous ones were allowed to covary. The model fit well, $\chi^2(2) = 3.75$, $p = .15$. As expected, autonomous and controlled motivations showed a positive relationship with levels of PD, and autonomous motivation showed a negative relationship while amotivation showed a positive relationship with the relative frequency of CEA (see Fig. 1b). The model explained 12 % of the variance in PD and 42 % of the variance in the relative frequency of CEA.

For the purposes of comparing the two models, we respecified both models to include the predictors from the other model as covariates. The CDT model was

[4] Festinger (1957) did not explicitly theorize about the relationship between attitude importance and the incidence of spontaneous attitude-behaviour inconsistencies. However, previous research implies that strong attitudes characterized by high confidence (i.e., certainty) and a wide latitude of rejection (i.e., extremity) bolster attitude-behaviour consistency (Fazio and Zanna 1978). These two attitudinal dimensions are captured by the measure of pro-environmental attitude strength used in this study.

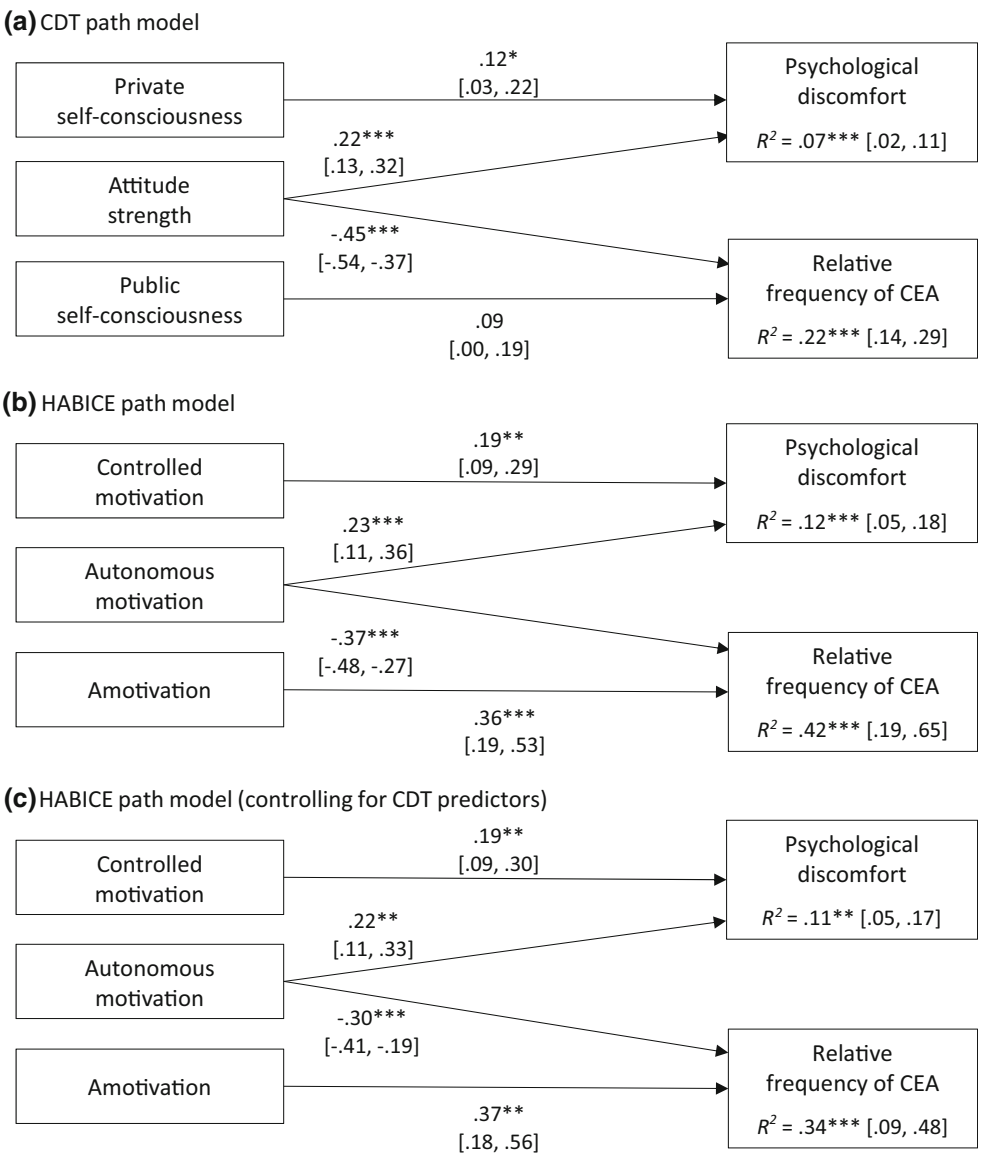

Fig. 1 Standardized parameter estimates with 95 % confidence intervals for the Study 2 (N = 282) path model analyses testing the predictors of dissonance arousal processes proposed by **a** cognitive dissonance theory (CDT), **b** the hierarchical action-based model of inconsistency compensation in the environmental domain (HABICE), and **c** the HABICE, controlling for CDT predictors (not shown on the figure). The covariances between all pairs of exogenous and all pairs of endogenous variables were freely estimated. *CEA* counter-environmental actions. *$p < .05$; **$p < .01$; ***$p < .001$

respecified to include the three contextual motivation variables and the HABICE model was respecified to include the attitude strength and the two self-consciousness variables. The respecified CDT model fit poorly, $\chi^2(8) = 49.14$, $p < .001$, and there were several large modification indices (MI > 5) suggesting that adding direct effects between the contextual motivation variables and the two endogenous variables would significantly improve model fit. By contrast, the respecified HABICE model (see Fig. 1c) fit well, $\chi^2(8) = 7.34$, $p = .50$, and did not produce large modification indices; the HABICE predictors explained a significant proportion of unique variance in PD (11 %) and the relative frequency of CEA (34 %). These results suggest that the HABICE has greater predictive power than CDT when it comes to explaining the frequency of ABIs and the magnitude of dissonance aroused by them.

Discussion

As expected based on Festinger's (1957) original theory, the domain's perceived importance and the cognitive accessibility of relevant cognitions facilitated dissonance arousal processes. In accordance with the HABICE (Lavergne and Pelletier 2015), however, accounting for distal motivation in the environmental domain superseded the predictive power of the CDT variables. Apparently, the processes involved in the arousal of dissonance depend not only on differences in perceived importance and cognitive accessibility, but also on the reasons why these differences

exist. The results suggest that dissonance processes guided by action tendencies to facilitate organismic integration versus instrumental outcomes arouse dissonance for different reasons. However, hypothesized differences in the quality of proximal motivation remain untested; Study 3 tested these hypotheses.

Study 3

The final study tested the hypothesis that contextual autonomous and controlled motivational orientations both lead to dissonance arousal and motivate people to compensate, but for qualitatively different reasons. We expected that both motivational orientations would motivate people to reduce the aroused dissonance but that contextual autonomous motivation would predict stronger motives to compensate to restore self-integrity while contextual controlled motivation would predict stronger motives to compensate to protect ego-invested self-structures. Amotivation toward the environment should predict a lack of dissonance arousal and motivation to compensate. We expected that PD would be primarily associated with motivation to reduce dissonance that is not directed toward the satisfaction of specific distal goals or needs.

Method

Participants

Participants were recruited using the same procedure described in Study 2 and received course credit for completing the online survey. Overall, 261 participants completed the study. However, we excluded from analyses 59 participants (22.6 %) who did not complete the Recall of a Recent ABI task (see Study 2) as instructed.[5] The majority of the sample (70.8 %) reported being in the 18 to 20 year age group. Most of the sample was female (74.3 %). In terms of first language, participants reported English (35.2 %), French (47.5 %), or another language (16.3 %), or did not respond (1.0 %).

Instruments

The scale instructions and items were presented as described in Study 2, except that all the scales were administered within a single survey designed specifically for this study. We used the Motivation Toward the Environment scale (see Study 2 for a description)—which showed a simplex-like pattern of correlations between its subscales—to compute mean composite scores of autonomous motivation ($\alpha = .95$), controlled motivation ($\alpha = .77$), and amotivation ($\alpha = .87$). Next, participants completed the Recall of a Recent ABI task and the Inconsistency Induced Affect scale (see Study 2 for descriptions), which we used to compute a mean composite score of psychological discomfort ($\alpha = .90$). Two scales were added to the survey to assess proximal motives to compensate.

Inconsistency compensation strategy recall scale Immediately after responding to the Inconsistency Induced Affect scale, participants indicated which strategy, among a list of twelve strategies, most closely corresponded to their response to the statement: "Following the inconsistent action, I reacted by…" The strategies checklist included behaviour modification or change strategies (3 items; e.g., "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.") and non-behavioural strategies, such as passive forgetting or distraction (three items; e.g., "Putting the inconsistency out of my mind.") and attitude change or cognitive restructuring (six items; e.g., "Questioning whether environmental sustainability is really that important to me personally."). Refer to Table 3 for a complete list of items. We included this scale to facilitate responses to the Motivation to Compensate scale below.

Motivation to compensate scale We adapted the Motivation to Compensate scale developed by Lavergne and Pelletier (2015) to assess four types of proximal motivation to compensate (see Table 4). Participants responded to 12 items completing the statement: "I reacted this way following the inconsistent action because…" on a 7-point Likert scale (1 does not correspond at all, 7 corresponds exactly). In addition to the self-integrity restoration motives (three items; e.g., "I wanted to act in a way that maintains my integrity.") and the ego-invested self-protection motives (three items; e.g., "I wanted to save face.") subscales from the original version, we added two subscales to assess a lack of specific motives or amotivation to compensate (three items; e.g., "I did not know what else to do.") as well as dissonance minimization motives (three items; e.g., "I wanted to rid myself of the negative emotions I was feeling."). We computed composite scores of dissonance minimization ($\alpha = .81$), self-integrity restoration ($\alpha = .84$), and ego-invested self-protection ($\alpha = .82$) motives to compensate, but we analyzed the amotivation to

[5] Compared to participants who were included in analyses ($n = 202$; see Table 3), those who were excluded from analyses ($n = 57$, $M = 0.39$, $SD = 0.23$) reported greater amotivation toward the environment, $t(253) = 2.37$, $p = .02$, 95 % CI [.01, .16], $d = .30$. There were no group differences on scores of autonomous or controlled motivation toward the environment or in gender or first language composition ($\alpha = .05$).

Table 3 Inconsistency Compensation Strategy Recall Scale item frequencies of Study 3

Item	Frequency
Behavioural modification strategies	
2. Actively looking for opportunities to act sustainably (consistently) in other situations	28 (13.9 %)
9. 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	17 (8.4 %)
12. Immediately correcting the inconsistent action (ex: repeating the action in a more sustainable fashion)	28 (13.9 %)
Non-behavioural strategies	
1. Putting the inconsistency out of my mind	36 (17.8 %)
3. Focusing my attention on other values, goals, and activities that I consider more important	16 (7.9 %)
4. Concluding that I could not have acted in any other way under the circumstances	11 (5.4 %)
5. Reminding myself that I possess many other qualities and characteristics that make me a good person	18 (8.9 %)
6. Deciding that there is no need to reduce my impact on the environment	5 (2.5 %)
7. Concluding that my action toward the environment is an indication of my true attitudes and beliefs about the environment	6 (3.0 %)
8. Questioning whether environmental sustainability is really that important to me personally	9 (4.5 %)
10. Mentally listing reasons why it wasn't my fault	5 (2.5 %)
11. Thinking that the action I just did, despite being unsustainable, was consistent with other values and goals I consider important	5 (2.5 %)

Items complete the statement: "How did you react following the inconsistent action? The strategy that most closely corresponds to my own reaction is: ___." Participants indicated the item number (1–12) that most closely corresponded to their own reaction to a recalled attitude–behaviour inconsistency

Table 4 Motivation to Compensate Scale items by subscale

Self-integrity restoration
I wanted to adjust my beliefs, attitudes, and actions to fit with the kind of person I really am
I wanted to act in a way that maintains my integrity
I wanted to act consistently with my own beliefs, attitudes, and values
Ego-invested self-protection
I wanted to avoid losing the respect of others
I wanted to save face
I wanted others to think that I am a person of integrity
Dissonance minimization
I could not go on with my day knowing what I did
I wanted to rid myself of the negative emotions I was feeling
I could not get the inconsistent action out of my mind
Lack of motives
I simply wanted to get on with my day. [Indifference]
I did not know what else to do. [Incompetence]
I did not have a specific reason for reacting the way I did. [No specific reason]

The items complete the statement: "I reacted this way following the inconsistent action because…" Participants indicated the extent to which each statement corresponded to their reasons for reacting the way they did following the inconsistent action on a 1 (*Does not correspond at all*) to 7 (*Corresponds completely*) scale

compensate subscale items separately because of modest inter-correlations (see Table 5).

Data analysis

The preliminary, correlation, and path analyses were conducted as described in Studies 1 and 2. Two-tailed Pearson correlation coefficients were computed between all pairs of composite variables (Table 5, Variables 1 through 7) and Spearman rho correlation coefficients were computed for all other pairs of variables. In terms of the path analyses, we tested both the exact fit hypothesis from the covariance matrix (see Appendix B in Supplementry materials) and we carried out tests of path invariance to compare predictors based on CDT with those based on the HABICE using Chi square difference tests to detect significant differences

between nested models (Satorra and Bentler 2001). A significant Chi square difference test indicates that the less restrictive model—the path model with fewer degrees of freedom—fits significantly better (i.e., explains more variance) than the more restrictive nested model.

Results

All but three participants recalled ABIs related to water conservation, waste diversion, or the reduction of greenhouse gas emissions. Descriptive statistics are presented in Table 5. Participants reported moderate levels of PD, of self-integrity restoration motives, and of a lack of motives to compensate, as well as moderately low levels of dissonance minimization and ego-invested self-protection motives to compensate.

Correlation analyses

Again, we found that contextual autonomous and controlled motivations (but not amotivation) were associated with greater PD. PD was positively associated with dissonance minimization, self-integrity restoration, and ego-invested self-protection motives to compensate, and with a lack of specific motives due to perceived incompetence. Though the latter correlation was unexpected, it is reasonable to believe that, at times, people may be motivated to compensate but may lack the resources or competencies to implement a strategy that satisfies particular motives.

Autonomous motivation was positively associated with dissonance minimization and self-integrity restoration motives to compensate, as predicted. Controlled motivation was positively associated with dissonance minimization and ego-invested self-protection motives to compensate, and with a lack of motives due to perceived incompetence and indifference. The latter two correlations are consistent with research showing that controlled motivation is associated with less perceived competence in the environmental domain (Pelletier et al. 1998) and with an amotivational state in the absence of behavioural contingencies (Deci et al. 1999). Amotivation was associated with a lack of motives due to indifference and for no specific reason, as expected. The three types of motives to compensate were positively intercorrelated. However, self-integrity restoration motives showed a negative relationship with a lack of motives for no specific reason, whereas ego-invested self-protection and dissonance minimization motives showed a positive relationship with a lack of motives to compensate due to perceived incompetence and indifference.

Path analyses

We conducted path analyses to compare the effects of PD, autonomous motivation, and controlled motivation on the different motives to compensate. Because amotivation

Table 5 Descriptive statistics and intercorrelations of the Study 3 variables

Variables	*n*	*M*	*SD*	Skew	Correlations								
					2	3[a]	4	5	6	7[a]	8	9	10
Contextual motivation													
1. Autonomous	199	4.59	1.36	−0.37	.46***	−.38***	.18*	.28***	.33***	.11	.15*	−.11	−.11
2. Controlled	199	3.45	1.01	−0.28	–	−.01	.32***	.32***	.09	.36***	.33***	.15*	.01
3. Amotivation	198	2.35	1.39	1.11		–	.00	.03	−.08	.14	.11	.23**	.19*
Dissonance arousal													
4. Psychological discomfort	194	3.55	1.43	0.03			–	.51***	.28***	.23***	.27***	.00	−.02
Motives to compensate													
5. Dissonance minimization	188	2.28	1.34	0.85				–	.50***	.54***	.41***	.18*	−.03
6. Self-integrity restoration	189	3.45	1.74	0.19					–	.42***	.14	−.06	−.28***
7. Ego-invested self-protection	188	2.00	1.22	1.18						–	.40***	.21**	−.02
Lack of motives to compensate													
8. Incompetence	184	2.63	1.76	0.77							–	.27***	.18*
9. Indifference	187	3.51	2.04	0.18								–	.23**
10. No specific reason	182	3.65	2.16	0.20									–

The correlations between Variables 1 through 7 are Pearson coefficients and the remaining correlations are Spearman's rho coefficients

[a] The scores were transformed to correct the skewed distribution

* $p < .05$. ** $p < .01$. *** $p < .001$

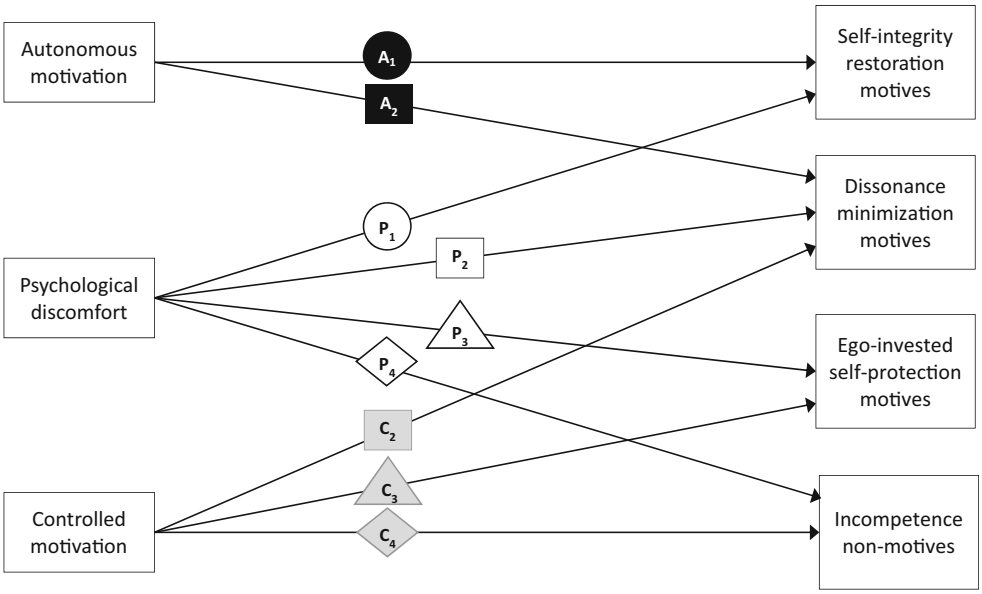

Fig. 2 Path model diagram of the combined predictors—based on cognitive dissonance theory and hierarchical action-based model of inconsistency compensation in the environmental domain—of motives to compensate for inconsistencies in the environmental domain of Study 3 ($N = 202$). Paths converging on a common outcome variable have labels with matching subscripts and shapes, and paths originating from a common predictor variable have labels with matching letters and shading. Corresponding standardized parameter estimates and path invariance tests are shown in Table 6

toward the environment and a lack of motives to compensate due to indifference and for no specific reason were unrelated to PD (i.e., dissonance arousal; see Table 5), we excluded these variables from analyses. The path models featured three exogenous variables or predictors–PD and autonomous and controlled motivation toward the environment–and four endogenous variables, namely dissonance minimization, self-integrity restoration, and ego-invested self-protection compensation motives, and a lack of motives to compensate due to perceived incompetence (i.e., incompetence non-motives). We performed three types of tests: (a) a test of the unconstrained model fit that combined predictions from CDT and the HABICE (see Fig. 2), (b) tests of path invariance to compare the direct effects converging on the same outcome variable, and (b) tests of path invariance to compare the direct effects originating from the same predictor variable. The results of each set of tests are described in the three sections that follow and summarized in Table 6. The coefficients corresponding to the relationships among the variables are presented in Table 6 and depicted graphically in Fig. 2.

Unconstrained model fit First, we assessed the fit of the path model combining the predictions derived from CDT with those derived from the HABICE (see Fig. 2) to ensure the hypothesized model was a good fit. In line with CDT predictions, we regressed the four motives onto PD. In accordance with the HABICE, we regressed dissonance minimization and self-integrity restoration motives onto autonomous motivation, and regressed dissonance minimization and ego-invested self-protection motives, as well as incompetence non-motives onto controlled motivation. The hypothesized path model fit well, $\chi^2(3) = 5.71$, $p = .13$. The standardized path estimates (see Table 6) were all positive and significant, except for the positive effect of PD on ego-invested self-protection motives. The unconstrained model explained 35 % of the variance in dissonance minimization motives, 19 % of the variance in self-integrity restoration motives, 18 % of the variance in ego-invested self-protection motives, and 13 % of the variance in incompetence non-motives.

Common outcome path invariance tests Second, we performed tests of path invariance by constraining each pair of direct effects converging on the same outcome variable to equality in turn (see the Fig. 2 paths labeled with matching subscripts and shapes) and compared each of the constrained models to the unconstrained model using Chi square difference tests (see Table 6). In terms of the predictors of self-integrity restoration motives, we found that the positive effects of autonomous motivation and PD were of equal magnitude, suggesting that the desire to compensate for inconsistencies authentically arises both because of the perceived authentic self-integrity threat implied by the inconsistency and because of the cognitive dissonance aroused by it. Next, we examined the predictors of ego-invested self-protection motives and found that the positive effect of controlled motivation was larger than the effect of PD on this variable; the results support the hypothesis that the desire to compensate for inconsistencies to save face arises primarily because of the ego-invested self-threat implied by the inconsistency.

In terms of dissonance minimization motives, the positive effect of PD was larger than the effect of autonomous motivation on this variable but equal to the effect of controlled motivation. The effects of autonomous and

Table 6 Standardized parameter estimates and path invariance tests of the Study 3 path model of motives to compensate

Path	Unconstrained Model			Path invariance tests[a]							
	λ	R^2	95 % CI	P_1	A_2	P_2	C_2	P_3	C_3	P_4	C_4
1. Self-integrity restoration		.19***	.10, .27								
Autonomous motivation (A_1)	.34***		.23, .44	1.44	18.67***	–	–	–	–	–	–
Psychological discomfort (P_1)	.21**		.10, .33	–	–	5.73*	–	9.73**	–	0.20	–
2. Dissonance minimization		.35***	.27, .43								
Autonomous motivation (A_2)	.18**		.08, .27		–	5.61*	0.19	–	–	–	–
Psychological discomfort (P_2)	.43***		.32, .53			–	1.59	19.42***	–	1.85	–
Controlled motivation (C_2)	.17*		.06, .29				–	–	7.57**	–	9.02**
3. Ego-invested self-protection		.18***	.11, .26								
Psychological discomfort (P_3)	.10		−.02, .21					–	10.80***	3.67	–
Controlled motivation (C_3)	.39***		.29, .48						–	–	7.20**
4. Incompetence		.13***	.05, .20								
Psychological discomfort (P_4)	.17*		.04, .31							–	1.50
Controlled motivation (C_4)	.27**		.14, .39								–

The corresponding path model diagram is shown in Fig. 2. CI = confidence interval

[a] Chi square difference tests [$\Delta\chi^2(1)$] comparing the unconstrained model [$\chi^2(3) = 5.71$, $p = .13$] to nested models in which a pair of paths originating from the same predictor variable (indicated by the letters A, P, or C) or converging on the same outcome variable (indicated by the subscripts 1 to 4) was constrained to equality. A significant test indicates that constraining the two paths to equality is not a good fit—the direct effects (λ) are not of equal magnitude

* $p < .05$. ** $p < .01$. *** $p < .001$

controlled motivation on dissonance minimization motives were equal. Motives to reduce dissonance seemed primarily related to the magnitude of the aroused dissonance and tendencies to regulate behaviour contingently to avoid undesirable outcomes. Finally, the positive effects of PD and controlled motivation on incompetence non-motives were equal. The tendency to use whichever compensation strategy is available or familiar—but not necessarily the most effective—is manifested when people are motivated to both reduce dissonance and avoid the undesirable outcomes of their actions.

Common predictor path invariance tests Finally, we assessed the invariance of each pair of direct effects originating from the same predictor variable to equality in turn (see the Fig. 2 paths labeled with matching letters and shading) and performed Chi square difference tests (see Table 6). The effect of PD on dissonance minimization motives was significantly larger than its effect on ego-invested self-protection and self-integrity restoration motives, as expected. PD had a larger effect on self-integrity restoration than on ego-invested self-protection motives; however, the effects of PD on each of the three motives to compensate were equal to the PD effect on incompetence non-motives. As hypothesized, the arousal of dissonance seems to create a motivational state directed primarily at reducing dissonance and, to a lesser extent, at restoring self-integrity, but may not lead to the consistent use of one or another compensation strategy if an individual does not truly value the dissonance domain or know how to compensate effectively for an ABI.

By contrast, the effect of autonomous motivation on self-integrity restoration motives was larger than its effect on dissonance minimization motives, supporting our hypothesis that the tendency to regulate behaviour authentically motivates people to restore authentic self-integrity rather than to strictly reduce dissonance when they perceive an ABI in an important life domain. The effect of controlled motivation on ego-invested self-protection motives was larger than its effect on both dissonance minimization motives and incompetence non-motives, and its positive effect on incompetence non-motives was larger than its effect on dissonance minimization motives. As hypothesized, regulating environmental behaviour contingently to obtain desired outcomes primarily motivates people to compensate for an ABI to save face—rather than strictly to reduce dissonance—and may lead individuals to use whichever strategy is available if they lack the resources needed to compensate for the perceived inconsistency effectively.

Independent samples t tests

The Inconsistency Compensation Strategy Recall item frequencies are reported in Table 3. Preliminary analyses indicated there might be motivational differences between

participants who recalled using a behavioural strategy ($n = 73$) versus another type of strategy ($n = 111$) to compensate for a recent ABI. Therefore, we conducted independent samples t-tests of the study variables by type of recalled strategy. There were four small to moderate effect sizes (d values between 0.20 and 0.50; Cohen 1992). Participants who reported using a behavioural compensation strategy reported less contextual amotivation, $M = 0.25$, SD = 0.22, $t(177) = -2.75$, $p = .01$, 95 % confidence interval (CI) [−0.17, −0.03], $d = 0.41$, and amotivation to compensate due to indifference, $M = 2.97$, SD = 1.84, $t(178) = -2.95$, $p = .004$, 95 % CI [−1.50, −0.30], $d = 0.44$, and for no specific reason, $M = 3.20$, SD = 2.16, $t(173) = -2.34$, $p = .02$, 95 % CI [−1.42, -0.12], $d = 0.36$, as well as more self-integrity restoration motives, $M = 3.81$, SD = 1.66, $t(180) = 2.54$, $p = .01$, 95 % CI [0.15, 1.16], $d = 0.38$, than participants who used a non-behavioural compensation strategy (contextual amotivation: $M = 0.35$, SD = 0.25; indifference: $M = 3.87$, SD 2.09; no specific reason: $M = 3.97$, SD = 2.12; self-integrity restoration: $M = 3.16$, SD = 1.73). These results agree with previous research showing that autonomous motivation is associated with the use of behaviour modification or change strategies and the avoidance of cognitive restructuring strategies (e.g., attitude change or trivialization; Lavergne and Pelletier 2015), and support the hypothesis that, when the domain is not self-relevant, people are not motivated to compensate or to use effortful regulatory strategies.

Discussion

As expected, the results suggest that the magnitude of dissonance (i.e., PD) has a larger effect on the *quantity* of proximal motivation to compensate (i.e., dissonance minimization motives) whereas contextual autonomous and controlled motivation exert larger effects on the *quality* of proximal motivation to compensate. Furthermore, it appears that it is the quality—rather than the quantity—of motivation that relates to the choice of inconsistency compensation strategy. The autonomous motivational orientation elicits self-integrity restoration motives and, to a lesser extent, dissonance minimization motives to compensate, which could explain why this motivational orientation seems related to the use of behavioural strategies to minimize inconsistencies and reduce dissonance—presumably to facilitate organismic integration via authentic regulation. By contrast, the controlled motivational orientation elicits ego-invested self-protection and dissonance minimization motives to compensate, as well as incompetence non-motives. There were no strategic preferences associated with these controlled motives. However, this orientation seems to elicit a lack of motives to compensate due to indifference when inconsistencies fail to arouse dissonance, which disposed people to favour non-behavioural compensation strategies. These findings support the assumption that controlled motivation embodies action tendencies to facilitate desired outcomes via contingent regulation.

General discussion

The purpose of the present research was to explore individual differences in dissonance arousal processes following a spontaneous ABI. We tested and compared complementary hypotheses derived from CDT (Festinger 1957), the action-based model of dissonance (Harmon-Jones et al. 2009), and SDT (Deci and Ryan 2008) using a series of correlation analyses (Studies 1–3) and path analyses (Studies 2 and 3). The results support the notion that ABIs arouse dissonance and motivate people to compensate for these perceived inconsistencies, as proposed by Festinger (1957). We found also that the magnitude of dissonance aroused by a counter-attitudinal action is directly proportional to the action domain's perceived importance and to the quantity of proximal motivation to compensate for the perceived inconsistency. In that regard, the present research is consistent with previous research showing that cognitive inconsistencies that arise in personally important domains are uncomfortable and lead to attitude or behaviour change (see Harmon-Jones 1999; Harmon-Jones et al. 2009; Leippe and Eisenstadt 1999 for reviews).

In agreement with Lavergne and Pelletier's HABICE model (2015), however, the pattern of results indicates that individual differences in motivational orientations affect both the quantity but, particularly, the quality of proximal motivation to compensate, which seems to clarify why ABIs are uncomfortable. The assumption that autonomous and controlled motivation, but not amotivation, act as distal motives for effective and unconflicted action that promote dissonance arousal and motivate people to compensate for a threatening cognitive inconsistency seemed supported. On the one hand, the tendency to regulate behaviour in a given domain relative to authentic self-structures (i.e., for autonomous reasons) motivates people to compensate for inconsistencies primarily to restore self-integrity, presumably to minimize self-integrity threats via authentic regulation. On the other hand, the tendency to regulate behaviour in a given domain relative to the behaviour's contingencies (i.e., for controlled reasons) motivates people to compensate for inconsistencies primarily to protect ego-invested self-structures, presumably to avoid the aversive consequences of counter-attitudinal actions via contingent regulation. Furthermore, there was evidence

that motivation at the contextual versus global level of generality is more strongly related to dissonance arousal in response to an ABI in a specific life domain, presumably because it embodies the domain's self-relevance.

Implications

A major implication of the present research is that individual differences in dissonance compensation processes reported in the literature (see Harmon-Jones et al. 2009; and Leippe and Eisenstadt 2010 for reviews) may be due to individual differences in distal motives that affect the quality of proximal motivation to compensate, rather than to personal or situational factors that strictly determine the quantity of proximal motivation to compensate. Whereas the magnitude of dissonance and the strength of dissonance minimization and ego-invested self-protection motives to compensate were not associated with strategic preferences, proximal (autonomous) motives to compensate to restore self-integrity appeared stronger among people who used behavioural compensation strategies. Conversely, a lack of proximal motives (amotivation) to compensate seemed stronger among people who used non-behavioural compensation strategies. These findings are consistent with previous research showing that contextual autonomous motivation predicts the use of behavioural strategies even in the absence of dissonance arousal, whereas contextual controlled motivation predicts the use of behavioural strategies to compensate for threatening inconsistencies and of cognitive strategies (e.g., attitude change) to compensate for non-threatening inconsistencies (Lavergne and Pelletier 2015).

Specifically, the present research suggests that the reasons *why* a given domain is considered personally important elucidates why cognitive inconsistencies are threatening and arouse dissonance, as well as why people are motivated to compensate for an inconsistency. Apparently, people who regulate behaviour in a given domain for autonomous reasons—because they identify with the behaviour or the domain, or have integrated it within themselves—appear motivated to compensate for a counter-attitudinal action because the action threatens authentic self-integrity. In turn, the perceived self-integrity threat motivates people to compensate for the counter-attitudinal action in a way that restores self-integrity; that is, by reversing or counter-balancing the impact of the inconsistent action (i.e., behaviour change) because revising their attitudes would presumably exacerbate the threat. By contrast, people who regulate behaviour in a domain for controlled reasons (i.e., because they value its instrumental outcomes, such as monetary rewards or public recognition) seem motivated to compensate for a counter-attitudinal action because the action threatens ego-invested self-structures, such as feelings of self-worth contingent on wealth and status. The perceived ego-invested self-threat motivates people to compensate for the counter-attitudinal action in a way that minimizes the threat. Presumably, if the inconsistent action occurred in public, they would be motivated to use overt strategies to minimize the threat (i.e., behaviour change) because this is the only strategy that has the potential to minimize the threat under these conditions; however, if the inconsistent action occurred in private, they would not be motivated to use a behavioural compensation strategy because there would be nothing to gain from the effort required to implement it.

Limitations and future research

The results provided indirect support for the idea that, when people become aware of spontaneous ABIs, distal autonomous motivation leads them to perceive an authentic self-integrity threat while distal controlled motivation leads them to perceive an ego-invested self-threat. However, there is a need to test these hypotheses directly. Because perception processes are more conducive to manipulation than measurement (Harmon-Jones et al. 2009), a thorough test of this hypothesis will require the use of an experimental dissonance induction paradigm to increase the salience of or direct attention to authentic versus ego-invested self-structures during perception processes. This approach would increase the internal validity of the findings and help overcome the limitations introduced due to the use of self-report data collection methods.

Another potential limitation of the research, particularly Studies 2 and 3, is that participants were allowed to freely recall a recent ABI from memory, but we did not control for the time lag between the event and the measurement, the content or themes of the recalled information, or the recalled action itself. Although preliminary analyses did not point to such differences, future research should attempt to replicate the present findings relative to a specific counter-environmental action (e.g., a recent trip by car in an urban center) and control for the time elapsed between the reference action and the measurement of the dissonance arousal processes triggered by that action.

We included people who did not perceive the environmental protection domain as self-relevant in Studies 2 and 3 to test our hypotheses regarding relationships between amotivation and dissonance constructs. This could explain the high non-participation rates for the Recall of a Recent ABI task in Studies 2 (16.7 %) and 3 (22.6 %), which were higher among individuals with weaker pro-environmental attitudes and greater amotivation toward the environment (see Footnotes 2 and 5). To the extent that the recall task was perceived as an environmentally-relevant action, the

tendency to not invest effort into the task or to describe a pro-environmental—rather than a counter-environmental—action by individuals who do not perceive the environmental protection domain as self-relevant or important is consistent with the HABICE. In any case, future research should aim to replicate these findings using more diverse samples and different life domains where people have positive attitudes toward a specific behaviour but do not always behave consistently with their attitudes, like health behaviour, dieting and exercising.

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Compliance with ethical standards

Conflicts of interest The authors declare that they have no conflict of interest.

Ethical standards All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards.

Informed consent Informed consent was obtained from all individual participants included in the study.

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