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Assessing immediate emotions in the theory of planned behavior can substantially contribute to increases in pro-environmental behavior

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The Theory of Planned Behavior (TPB) is a highly influential and powerful behavior change model that offers promising guidance on promoting urgently needed, pro-environmental action. Recent pro-environmental research has successfully augmented TPB using *anticipated emotions*—the emotions an individual consciously predicts they will experience in relation to possible outcomes of their decision. However, *immediate emotions*—the emotions an individual actually experiences during decision-making—have received far less attention. Given that immediate emotions are relevant to pro-environmental decision-making and can address the theoretical and empirical limitations of TPB, we contend that pro-environmental studies should explicitly examine immediate emotions within the TPB framework. This article aims to stimulate rigorous research that enhances pro-environmental communication and policymaking by providing integrative insights into immediate emotions along with recommendations for evaluating immediate emotions in a pro-environmental TPB context.

KEYWORDS

behavior change, decision-making, immediate emotions, pro-environmental action, theory of planned behavior

1 Introduction

Collective behavioral changes at the individual level are pivotal (Williamson et al., 2018) in addressing the current environmental plight (Bradshaw et al., 2020). Despite numerous opportunities for individuals to substantially protect the environment (Wynes and Nicholas, 2017; Williamson et al., 2018), conventional efforts encouraging pro-environmental behaviors have to date been largely ineffective, a situation that partly stems from a flawed understanding of human behavior (Clayton et al., 2015; Green et al., 2019). Current research suggests that psychological theories can help inform efforts to promote such behaviors. Among these theories is Ajzen's Theory of Planned Behavior (TPB), which has successfully predicted individuals' intentions to engage in various behaviors spanning food waste reduction

(Graham-Rowe et al., 2015), eco-friendly dining (Kim et al., 2013), and air conditioning use reduction (Lam et al., 2022).

The quintessential TPB model posits that our *attitudes* (i.e., the evaluation of behaviors as favorable or unfavorable), *subjective norms* (i.e., the perceived social pressure to perform a behavior), and *perceived behavioral control* (i.e., the extent that the performance of a behavior is perceived to be within our control) influence our intention to perform a behavior, which in turn predicts and guides our performance of the behavior (Ajzen, 2011; Ajzen and Schmidt, 2020). While alternative models are also constructive for explaining pro-environmental behaviors (Sawitri et al., 2015; Keller et al., 2019), TPB is notable for several reasons. First, TPB has reportedly contributed to 17 of 83 behavior change theories (Michie et al., 2014) and is among the most frequently applied models within (Sawitri et al., 2015; Tian and Liu, 2022) and beyond (Ajzen, 2011; Yuriev et al., 2020) the pro-environmental domain. Second, TPB yields highly effective behavior change interventions (Yuriev et al., 2020) comparable to other prominent theories (e.g., Transtheoretical Model of Behavior Change and Social Cognitive Theory; Ajzen and Schmidt, 2020). Lastly, TPB exhibits parsimony and flexibility, allowing behavioral scientists to easily incorporate and evaluate potential constructs (Yuriev et al., 2020).

However, TPB gives no formal role to emotions (Ajzen and Schmidt, 2020) and minimizes their importance in measurement, reasoning that emotions' effects on behavior are mediated by other factors (Ajzen, 2011). Instead, emotions are generalized as shaping the development and/or retrieval of background beliefs concerning a behavior's outcomes, social acceptability, and ease of performance; these beliefs may then inform our attitudes, subjective norms, and perceived behavioral control regarding the behavior (Ajzen, 2011). Several health psychology studies have adopted this logic by considering emotions as an affective sub-component of attitude (French et al., 2005; Kobbeltved and Wolff, 2009; Rocheleau, 2013). Clowes and Masser's (2012) study, in particular, found that anxiety correlated with less positive attitudes, subjective norms, and perceived behavioral control in relation to blood donation (Clowes and Masser, 2012).

Pro-environmental TPB scientists should then analyze emotions explicitly. Even if emotions tend to shape behavior indirectly, their dynamic, multidimensional nature (Chapman et al., 2017) and importance in guiding our responses to pro-environmental opportunities (Brosch, 2021; Stanley et al., 2021), messages (Nabi et al., 2018), and policies (Smith and Leiserowitz, 2014; Lu and Schuldt, 2015) mean that environmental advocates can benefit from a more nuanced understanding of emotions. This is especially true since pro-environmental communicators and public authorities often oversimplify and overlook the full emotional impacts of their initiatives, resulting in suboptimal or even counterproductive outcomes (Agyeman et al., 2009; Chapman et al., 2017; Stanley et al., 2021). Furthermore, previous TPB studies in other disciplines reported significant increases in their model's explanatory power after specifically accounting for emotions (Mohiyeddini et al., 2009; Clowes and Masser, 2012; Bee and Madrigal, 2013; Berki-Kiss and Menrad, 2022), suggesting that TPB's core constructs do not capture the influence of emotions in their entirety.

Accordingly, recent pro-environmental studies have investigated *anticipated emotions* as a separate TPB construct. Anticipated emotions, or the emotions an individual consciously predicts they will experience given their perceptions of the decision outcomes (Loewenstein, 2000; Schlösser et al., 2013; Dunning et al., 2017), were found to enhance TPB's predictions of pro-environmental intentions (Kim et al., 2013; Graham-Rowe et al., 2015; Lam et al., 2022). For example, Graham-Rowe et al.'s extended TPB model with anticipated regret accounted for 64% of the variance in food waste reduction intentions, while the original TPB model accounted for 55% (Graham-Rowe et al., 2015). Lam et al.'s extended TPB model with anticipated regret likewise accounted for an additional 32% of variance in intentions to limit air conditioning use (Lam et al., 2022). However, we contend that existing pro-environmental TPB studies have yet to comprehensively assess another category of emotions with significant implications for pro-environmental interventions, namely *immediate emotions*. Thus, this paper aims to present a compelling case for the utility and feasibility of examining immediate emotions in a pro-environmental TPB context.

2 Immediate emotions in pro-environmental decision-making

Immediate emotions are the visceral emotions an individual experiences during decision-making (Loewenstein, 2000; Schlösser et al., 2013) and comprise a combination of incidental (i.e., arising from factors and/or events outside of the decision at hand) and anticipatory (i.e., arising from the decision-making process) affect (Loewenstein and Lerner, 2003; Mankad, 2012; Dunning et al., 2017). Importantly, anticipatory emotions differ from anticipated emotions in that the former is experienced in the current moment, whereas the latter is more closely associated with "cold" cognition (Baumgartner et al., 2008). Table 1 summarizes the subtle distinctions between the classifications of emotions mentioned throughout our discussion.

Although immediate emotions have conventionally been studied to explain economic decision-making under risk (Schlösser et al., 2013; Dunning et al., 2017), their attributes render them pertinent to pro-environmental behaviors. Immediate emotions, for one, advise and moderate decision-making behaviors by inducing heightened or reduced risk perceptions (Table 1, column 3, rows 3–4; Loewenstein and Lerner, 2003; Lerner et al., 2015; Sobkow et al., 2016). Notably, risk perception plays a critical role in shaping our receptiveness to pro-environmental acts. At the micro and meso levels of society, the objective and perceived risks of eco-friendly activities like cycling (Ravensbergen et al., 2020) and sustainable consumption (e.g., ingestion of reclaimed sewage; Powell et al., 2019) may serve as barriers to performing these behaviors. At the meso and macro levels, the diminished perception of risk regarding environmental degradation among key decision-makers commonly results in absent to minimal pro-environmental action (Rickards et al., 2014; Bradshaw et al., 2020). More thorough examinations of immediate emotions in these contexts can, therefore, enrich our understanding of how emotions can be leveraged to (1) lessen the public's risk-based avoidance of high-impact, eco-friendly behaviors and (2) address the pervasive underestimation of environmental threats.

Immediate emotions can also drive behaviors by reinforcing bias toward short-term decision-making (Table 1, column 3, rows 1–2; Loewenstein, 2000; Loewenstein and Lerner, 2003; Schlösser et al., 2013; Dunning et al., 2017). This aspect also makes immediate emotions worthy of increased empirical attention, considering how

TABLE 1 Distinguishing characteristics of anticipated, immediate, anticipatory, and incidental emotions.

Category	Description	Example with potential behavioral consequence
Anticipated	*Forecasted* in relation to perceived outcomes of a given behavior; *not experienced* during decision-making; may or may not be experienced *after* decision-making (Loewenstein and Lerner, 2003; Mankad, 2012; Feil et al., 2022)	Individual predicts they will experience regret in the event they lose money after choosing to gamble ➔ anticipated regret deters gambling (Schlösser et al., 2013)
Immediate	Experienced *during* decision-making; often accompanied by changes in physiological state (Loewenstein, 2000; Schlösser et al., 2013)	Individual experiences excitement when presented with gambling opportunity ➔ excitement incentivizes gambling (Schlösser et al., 2013)
Anticipatory	Subcategory of immediate emotion; experienced *during* decision-making as a result of *contemplating a given behavior* (Loewenstein and Lerner, 2003; Mankad, 2012; Feil et al., 2022)	Anxiety in response to thoughts of investing ➔ heightens perceived riskiness of investment option ➔ potential investor warded off (Loewenstein and Lerner, 2003)
Incidental	Subcategory of immediate emotion; experienced *during* decision-making as a result of *extraneous factors* (Loewenstein and Lerner, 2003; Mankad, 2012; Dunning et al., 2017)	Prior happiness spills over ➔ assuages potential investor's apprehension, encouraging investment (Loewenstein and Lerner, 2003)

individuals and institutions often prioritize the short-term benefits of pro-environmental inaction over the long-term benefits of pro-environmental action (Kollmuss and Agyeman, 2002; Rickards et al., 2014). To illustrate, positive immediate emotions (e.g., happiness) associated with meat consumption and luxury vehicle usage may hinder the public from adopting a plant-based diet (Hopwood and Bleidorn, 2019) and a car-free life (Waitt and Harada, 2012), respectively, despite the known potency of these lifestyle changes in reducing greenhouse emissions (Wynes and Nicholas, 2017; Williamson et al., 2018). Negative immediate emotions (e.g., apprehension) linked to endorsing environmental initiatives that are politically unpopular and/or jeopardize a party's agenda may prod policymakers and politicians to prioritize their candidacy and public approval instead (Rickards et al., 2014; Hornsey and Fielding, 2020).

Other studies have continued to corroborate immediate emotions' relevance in pro-environmental decision-making. For instance, Lammers et al. (2019) identified anticipatory disgust as the strongest predictor for safe insect consumption, outweighing participant awareness of entomophagy's low-risk, high-return benefits (Lammers et al., 2019). Lu and Schuldt (2015) reported that adults recalling an autobiographical event eliciting guilt endorsed industry-targeted policies more strongly than those recalling a neutral one, thereby proving the utility of immediate emotions' incidental dimension (Lu and Schuldt, 2015).

3 The current research gap

Immediate emotions' potential for supporting pro-environmental behavior change is presently limited by a two-part literature gap. First, existing pro-environmental TPB studies underexplore immediate emotions. Advanced Google Scholar searches up to November 2022 using "TPB" and "immediate emotion*" yielded one pro-environmental TPB study that briefly mentioned immediate emotions (Ibrahim et al., 2021), two pro-environmental TPB studies suggesting immediate emotions as a possible avenue of research (Kim et al., 2013; Brosch et al., 2014), and two pro-environmental papers examining the utility of immediate emotions for enhancing decentralized water system acceptance (Mankad, 2012) and public service announcement effectiveness (Poškus et al., 2019). Another search using "TPB" and "anticipatory" or "incidental" yielded one pro-environmental study that evaluated anticipatory worry's influence on cyclists' risk-taking behavior (Kummeneje and Rundmo, 2020). A final search using "TPB" and "emotion" or "affect" yielded a single pro-environmental TPB study that investigated whether immediate emotions toward an electric car's appearance predicted intentions to use electric cars (Moons and De Pelsmacker, 2012).

Second, pro-environmental TPB studies inadequately represent and analyze immediate emotions, with most studies either investigating anticipated emotions as an independent TPB construct (Kim et al., 2013; Graham-Rowe et al., 2015; Ibrahim et al., 2021; Lam et al., 2022), relying on other proposed TPB constructs (e.g., attitudes, environmental concerns, moral norms, etc.) to stand for emotions (de Leeuw et al., 2015; Rhodes et al., 2015; Hameed et al., 2019; Savari and Gharechaee, 2020), or omitting the demarcation between anticipated and immediate emotions (Russell et al., 2017; Ansu-Mensah and Bein, 2019; Berki-Kiss and Menrad, 2022; La Barbera et al., 2022). As part of our efforts to confirm the existence of this methodological gap, we scanned through the papers' procedures to account for possible discrepancies in how researchers used (or did not use) affective terminology. Interestingly, we observed that studies typically employed approaches that did not elicit immediate emotions or consider their temporal specificity. Simply put, the researchers did not (1) have participants engage in actual decision-making [e.g., Russell et al. (2017) and La Barbera et al. (2022) inquired about participants' feelings toward food waste without presenting them with an opportunity to make a concrete decision between retaining or reducing current levels of personal food waste] or (2) use questionnaires with the appropriate written cues [e.g., Ansu-Mensah and Bein's (2019) questionnaire asks "I *will* feel X" rather than "I feel X," thereby assessing anticipated emotions; Berki-Kiss and Menrad's (2022) questionnaire asks "When I decide to do X, I feel Y," which implies that the participants are reporting emotions that occurred *after* a decision was made].

This oversight may ultimately result in missed opportunities for campaigners, policymakers, and other critical actors to address pressing environmental threats. Following this rationale, we aim to stimulate more empirical attention toward immediate emotions by delineating the potential theoretical and empirical benefits this construct brings to the TPB framework. We also provide pointers for productively evaluating immediate emotions.

4 Augmenting TPB with immediate emotions

Like other behavior change models, TPB comes with theoretical limitations, one of which is the intention-behavior gap. The intention-behavior gap refers to the discrepancy between an individual's predicted and actual behavior (Ajzen and Schmidt, 2020); plausible explanations for this phenomenon include the provisional nature of intentions and the presence of methodological drawbacks (Sutton, 1998; Yuriev et al., 2020). Given this information, immediate emotions can likely ameliorate this shortcoming in two ways. First, a TPB model extended with immediate emotions may possess an increased capacity for explaining specific changes in intention. This is probable since immediate emotions at high intensities can alter our behaviors by overwhelming the cognitive processes responsible for deliberate decision-making (Loewenstein, 2000; Loewenstein and Lerner, 2003). It is known that individuals experiencing heightened levels of immediate emotions tend to be more impulsive and face greater difficulties with suppressing problematic behaviors like aggression, overconsumption, and substance abuse; here, immediate emotions can be construed as disrupting pre-existing intentions to avoid these adverse actions (Pearlstein et al., 2019; Elliott et al., 2023).

Second, TPB studies that deliberately factor in immediate emotions will have the opportunity to adopt empirical approaches that remedy their methodologies' weaknesses. Specifically, research on immediate emotions generally have participants engage in tasks that activate their decision-making processes; this is done to accommodate the fact that immediate emotions are experienced *during* decision-making (Schlösser et al., 2013). For example, Notaro and Grilli's (2022) inquiry on how emotions shape public preferences for wildlife conservation had participants choose between different monetary amounts that they would donate to conservation efforts (Notaro and Grilli, 2022). It is also common for affective research to ascertain participants' immediate emotions via objective physiological measures, which is feasible given that immediate emotions are *actually experienced* (Schlösser et al., 2013). To illustrate, Bettiga and Lamberti (2020) successfully distinguished anticipatory happiness from anticipated happiness by analyzing participants' micro-expressions (Bettiga and Lamberti, 2020). These experimental methods have significant implications for increasing the reliability of TPB findings, especially since TPB studies heavily rely on questionnaires and other self-reported measures that are (1) usually limited to gauging hypothetical rather than authentic intentions (Sutton, 1998) and (2) highly susceptible to self-report bias (Yuriev et al., 2020).

Besides the possibility of reducing TPB's intention-behavior gap, immediate emotions could improve TPB's predictive power by serving as potential measures of past behavior. To clarify, psychologists have recognized past behavior as a significant indicator for future conduct but could not explain this phenomenon with TPB's main predictors or other commonly considered constructs (e.g., anticipated emotions, habit strength, and self-identity; Ajzen, 2011). Ajzen thus proposed the existence of "missing" variables that mediate past behaviors' influence on intentions. Prior research paints immediate emotions as a strong contender. For instance, Feil et al.'s (2022) investigation on the affective drivers of physical activity discovered that immediate emotions associated with participants' earlier fitness sessions (1) resurfaced when participants pondered a prospective opportunity to exercise and (2) correlated with the participants' overall exercise frequency (Feil et al., 2022). Kuwabara and Pillemer (2010) analogously observed that participants prompted to recall pleasant university experiences subsequently experienced positive immediate emotions while deciding whether to contribute to their alma mater; additionally, the more intense their positive immediate emotions were, the stronger their intentions and decisions to contribute (Kuwabara and Pillemer, 2010).

Neuropsychology also supports this notion that immediate emotions recur and shape current conduct when previous behaviors or experiences are recalled. According to Damasio's somatic marker hypothesis, prior decision-making events are coupled with bodily responses such as changes in blood pressure, electrodermal activity, and heart rate; when an individual encounters similar decision-making opportunities in the future, these bodily responses are reproduced and function as biological signals that antecedently guide conscious decision-making (Damasio et al., 1996). In other words, immediate emotions—which are tied to changes in physiological states (Loewenstein, 2000; Schlösser et al., 2013; Dunning et al., 2017)—can be interpreted as evolutionary features designed to rapidly inform our behavioral intentions. Extant research has also identified immediate emotions' visceral aspect as a critical element for adaptive learning and decision-making (Carter and Pasqualini, 2004; Ohira, 2010), with some studies describing this facet as offering biologically "preprogrammed but partially modifiable behavioral routines" (Pacella et al., 2017; Tyng et al., 2017). In summary, a TPB model extended with immediate emotions may better predict our intentions because it would likely account for past behavior's residual effects on current intention.

Altogether, we strongly recommend that pro-environmental TPB scientists place greater emphasis on immediate emotions and their associated evaluation methods when designing their studies. Table 2, informed by our discussion and literature review findings, presents guidelines for prospective researchers looking to examine immediate emotions as a distinctive variable.

5 Discussion and future research

Thus far, the prospects of explicitly examining immediate emotions within TPB appear highly promising. Immediate emotions are not only relevant for a wide variety of optimal pro-environmental behaviors but also possess the potential to mitigate TPB's intention-behavior gap and the unexplained, residual effects of past behavior on current decision-making. Our contribution lies in (1) identifying the empirical, methodological, and interdisciplinary gap pertaining to immediate emotions in pro-environmental TPB literature and (2) offering suggestions for addressing this gap.

Nonetheless, there are limitations to this paper. First, immediate emotions are discounted from further TPB scrutiny because they only directly influence intentions in special circumstances [e.g., at high levels of intensity (Loewenstein, 2000; Loewenstein and Lerner, 2003) and when memories of past behavior are triggered (Kuwabara and Pillemer, 2010; Feil et al., 2022)]; Ajzen's sufficiency assumption states

TABLE 2 Recommendations for empirically evaluating immediate emotions.

Immediate emotions' attribute of interest	Suggested research protocol	Example set up
Occurrence *during* decision-making (i.e., temporal specificity) (Loewenstein, 2000; Schlösser et al., 2013)	1. Engage participants in tasks that activate their decision-making processes. 2. Use appropriate verbal and/or written cues when questioning participants about their immediate emotions.	• Participants are presented with various pro-environmental options and instructed to decide as if their selection was binding (Notaro and Grilli, 2022). • Researchers explain the differences between anticipated and immediate emotions to participants (Feil et al., 2022). • Researchers explicitly ask participants to report how they feel *right now* (Clowes and Masser, 2012; Schlösser et al., 2013; Feil et al., 2022).
Association with hot-cognition and visceral feelings (Loewenstein, 2000; Schlösser et al., 2013; Dunning et al., 2017)	1. Assess and verify immediate emotions using physiological measures.	• Researchers analyze participants' micro-expressions to distinguish between anticipated and anticipatory emotions (Bettiga and Lamberti, 2020).
(Potential) mediator between past behavior and intention (Kuwabara and Pillemer, 2010; Feil et al., 2022)	1. Inquire about emotional memories related to the study's behavior of interest. 2. Evaluate data to identify correlations between past behavioral experience, present immediate emotions, and participants' behavioral intentions/performance.	• Researchers conduct face to face interviews where participants discuss how their prior behavioral experiences relate to their current anticipatory emotions toward a comparable, target behavior; data is then decoded and correlated with how frequently participants perform the targeted behavior (Feil et al., 2022).

that additional variables merit investigation only if they consistently share a direct, causal relationship with intentions (Ajzen, 2011). It is then imperative to emphasize that regardless of Ajzen's stance, immediate emotions in their entirety (including their indirect effects on intentions) are important for influencing and understanding behaviors (Loewenstein and Lerner, 2003) as well as for designing interventions (Chapman et al., 2017). Pro-environmental TPB scientists have even acknowledged the importance and necessity of studying traditionally secondary but contextually significant variables (Yuriev et al., 2020).

Second, while it is ideal to engage participants in authentic decision-making and to verify their immediate emotions through objective physiological measures, executing these research tasks may conflict with the researchers' time and monetary constraints. In situations where it is unfeasible to employ these methods, researchers can consider designing and relying on more comprehensive questionnaires that include both discrete (e.g., studying specific immediate emotions like immediate anxiety; Clowes and Masser, 2012; Feil et al., 2022) and dimensional (e.g., assessing immediate emotions on a continuum like immediate levels of arousal; Schlösser et al., 2013) measures.

Finally, our recommendations for empirically evaluating immediate emotions may be insufficient for studying mixed emotions. Individuals can experience different immediate and anticipated emotions simultaneously (Loewenstein and Lerner, 2003; Dunning et al., 2017), which makes it less straightforward to understand how immediate emotions might guide our decisions to engage in pro-environmental behaviors. Future research will need to determine how specific immediate emotions interact with each other, the necessary conditions for one emotional reaction to emerge over another, and how these interactions may differ between short and long-term decision-making. Ultimately, a thorough understanding of the mechanisms through which immediate emotions impact our decisions and behaviors can have powerful implications for designing interventions that stimulate urgently needed pro-environmental action.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material, further inquiries can be directed to the corresponding author.

Author contributions

VH: Conceptualization, Project administration, Writing – original draft, Writing – review & editing. AB: Writing – review & editing. JA: Writing – review & editing. DK: Writing – review & editing. SB: Writing – review & editing. JM: Writing – review & editing. CP: Conceptualization, Writing – review & editing. DB: Conceptualization, Project administration, Supervision, Writing – original draft, Writing – review & editing.

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Conflict of interest

The authors declare that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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