



Toward a new measure of organizational environmental citizenship behavior



Jennifer L. Robertson ^{a,*}, Julian Barling ^b

^a Western University, 1151 Richmond Street, Social Science Centre, Rm 4330, London, Ontario N6A 5C2, Canada

^b Smith School of Business, Queen's University, Kingston, Ontario K7L 3N6, Canada

ARTICLE INFO

Article history:

Received 24 May 2016

Received in revised form 5 February 2017

Accepted 6 February 2017

Keywords:

Organizational environmental citizenship behavior

Organizational citizenship behavior

Workplace pro-environmental behavior

Organizational environmental sustainability

Scale development and validation

ABSTRACT

Previous work has conceptualized workplace pro-environmental behaviors within the organizational citizenship behavior framework and a scale to measure these behaviors has been developed. The goal of the present research was to address conceptual and psychometric issues of this scale by: (a) conceptualizing organizational environmental citizenship behavior within the dominant target-based framework, (b) developing and refining a new, more comprehensive measure of organizational environmental citizenship behavior and (c) validating this new measure by providing evidence for its content, construct, convergent, discriminant, concurrent, incremental concurrent and nomological validity, and its internal and temporal stability. To this end, six separate studies (N = 652) were conducted, which together produced a psychometrically acceptable measure of organizational environmental citizenship behavior. Theoretical and practical implications from this research and direction for future research are discussed.

© 2017 Elsevier Inc. All rights reserved.

Organizations' environmental footprints have attracted much interest over the last few decades. Although organizations contribute significantly to environmental degradation, they also have the potential to enhance environmental preservation (Ones & Dilchert, 2012). Many of the environmental initiatives organizations are implementing to improve their environmental performance involve employees engaging in pro-environmental behaviors that, while not part of their formal job descriptions, contribute to the success of formal environmental management systems. As such, these behaviors are considered to be an important contributor to organizational environmental sustainability and have attracted much scholarly interest (e.g., Boiral & Paillé, 2012; Daily, Bishop, & Govindarajulu, 2009); yet, like many newly-developed constructs, workplace pro-environmental behaviors are conceptualized and measured in different ways (e.g., Boiral & Paillé, 2012; Daily et al., 2009; Robertson & Barling, 2013), often without any organizing theoretical foundation.

Recently, scholars have looked to the organizational citizenship behavior (OCB)-defined as, "individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate, promotes the effective functioning of the organization" (Organ, 1988, p. 4)-literature to conceptualize workplace pro-environmental behaviors. Specifically, two independent groups of researchers (e.g., Boiral, 2009; Daily et al., 2009) extended the OCB framework to conceptualize organizational environmental citizenship behavior

(OCBE) as "individual and discretionary social behaviors that are not explicitly recognized by the formal reward system and that contribute to a more effective environmental management by organizations" (Boiral, 2009, p. 223). Based on this definition, Boiral and Paillé (2012) developed and partially validated a measure of OCBE that is comprised of three factors: eco-initiatives, eco-helping, and eco-civic engagement. Although an important initial step, Boiral and Paillé did not assess their measure's content and criterion-related validity, nor did they assess convergent validity with similar measures or their scale's temporal stability.

While these methodological issues limit our confidence in the psychometric properties of Boiral and Paillé's measure, our primary concerns with their scale lie within the theoretical framework on which their measure is based and their operationalization of OCBE. First, Boiral and Paillé developed their measure based on Organ, Podsakoff, and MacKenzie's (2006) six dimensional OCB model and not the dominant target-based framework (Williams & Anderson, 1991), which is considered to be the most comprehensive, parsimonious and conceptually meaningful model into which other sub-dimensions can be subsumed (Podsakoff, Whiting, Podsakoff, & Blume, 2009; Spitzmuller, Van Dyne, & Ilies, 2008). Second, we question as to how certain items reflect the factor structure of Boiral and Paillé's scale. In particular, we are uncertain how the item "I make suggestions to my colleagues about ways to protect the environment more effectively, even when it is not my direct responsibility" reflects the eco-initiatives factor (i.e., individual workplace pro-environmental behaviors) rather than eco-helping (i.e., helping colleagues to become more environmentally friendly). Third,

* Corresponding author.

E-mail address: jennifer.robertson@uwo.ca (J.L. Robertson).

although Boiral and Paillé's scale is appropriately general in the sense that it can be applied to various industries, organizations and jobs, the broadness of their measure of eco-initiatives is problematic. Specifically, this sub-scale assesses the extent to which employees engage in pro-environmental behaviors in general (e.g., "I carry out environmental actions and initiatives in my daily work activities"), and therefore, contrary to domain sampling theory (which highlights the importance of scale items adequately reflecting the construct they purport to measure; Ghiselli, Campbell, & Zedeck, 1981; Hinkin, 1998), does not include specific workplace pro-environmental behaviors (e.g., recycling and conservation). As a result, their measure does not adequately capture the full range of behaviors that comprise OCBE and only provides partial insight into the nature of them. Creating behavioral scales requires a delicate balance of precision and generalizability. Perhaps not surprisingly, Boiral, Paillé, and Raineri (2015) have indicated that future research should combine their scale with measures that assess concrete workplace pro-environmental behaviors.

Given these issues, the OCBE construct remains to be adequately defined and a fully validated comprehensive measure does not exist. Effectively conceptualizing and measuring workplace pro-environmental behavior is crucial, as the absence of a unifying framework and corresponding measure will likely hinder future research. Further, without a comprehensive measure of OCBE, organizations cannot gauge how frequently employees enact different types of pro-environmental behaviors. This is important as research shows individuals who engage in one type of pro-environmental behavior (e.g., recycling) do not necessarily engage in other types (e.g., conservation behaviors; see Steg & Vlek, 2009 for a review). As a result, companies are unable to tailor interventions to target influencing specific types of OCBE. Accordingly, our goals in this research were to: (a) conceptualize OCBE within the dominant target-based OCB framework, (b) develop and refine a more comprehensive measure of OCBE that is precise (i.e., assesses specific workplace pro-environmental behaviors) yet general (i.e., encompasses general families of behaviors that can be enacted across various contexts) in nature, and (c) fully validate this measure by providing evidence for its internal and temporal stability, and its content, construct, convergent, discriminant, concurrent, incremental concurrent and nomological validity. Doing so will enable researchers to continue to investigate the nomological network of OCBE and enhance confidence in any resulting findings, while at the same time, providing organizations with a comprehensive tool that can be used to identify the frequency with which employees engage in various types of pro-environmental initiatives.

1. Theoretical development

1.1. Extending the target-based typology to include OCBE

Workplace pro-environmental behaviors are best conceptualized within the OCB framework because the majority of them (i.e., 70–85%; Boiral et al., 2015) represent employee initiatives that are discretionary and not tied to the formal reward system. However, proposing yet another dimension of OCB is hazardous. Spitzmuller et al. (2008) note that the proliferation of OCB dimensions makes it difficult to establish a unified research domain and develop a coherent nomological network. Thus, they recommend that future research use the target-based framework proposed by Williams and Anderson (1991), and as a result, recent research is increasingly relying on this framework (e.g., Decoster, Stouten, Camps, & Tripp, 2014; Ferris, Lian, Beown, & Morrison, 2015; Podsakoff et al., 2009). The target-based framework (Williams & Anderson, 1991) includes two forms of OCB: those directed toward the organization (OCBO), which include "behaviors that benefit the organization in general" (p. 601–602); and those directed toward individuals (OCBI), which include "behaviors that immediately benefit specific individuals and indirectly through this means, contributes to the organization" (p. 602).

To avoid adding further confusion to the literature, and for reasons previously discussed, we believe workplace pro-environmental behaviors are best conceptualized within the target-based framework and a measure of such behaviors should be developed based on this framework. Thus, we define OCBE as *individual behavior that is discretionary, not directly or explicitly recognized by the formal reward system, and that in the aggregate, immediately benefits the natural environment, and indirectly through this means, contributes to the organization and benefits specific individuals*. Examples of these behaviors include recycling, conserving energy at work and encouraging other employees to reduce their environmental impact. Like Boiral (2009), we define OCBE as discretionary behavior aimed at improving the natural environment. We diverge from Boiral (2009) inasmuch as our definition is consistent with the conceptualization of Williams and Anderson's (1991) target-based typology, focusing as it does on immediately benefiting the natural environment, and indirectly benefitting the organization (consistent with OCBO) and specific individuals (consistent with OCBI).

1.2. OCBE benefits the natural environment, organizations and specific individuals

By contributing to organizations' environmental performance, OCBE will immediately benefit the natural environment, and indirectly through this means contribute to the success of the organization (see below). For example, a reduction in the amount of waste produced by an organization largely depends on employees engaging in conservation and recycling behaviors. Boiral and Paillé (2012) suggest that there are four ways in which workplace pro-environmental behavior can improve an organization's environmental performance: Individual behavior that: (a) challenges current practices and promotes new environmental initiatives or (b) improves environmental procedures, (c) individual ideas and suggestions about eco-innovations, and (d) employee involvement in environmental management systems. Supporting these claims are several studies that provide empirical support for the impact of employees' environmental behaviors on organizations' environmental performance (e.g., Boiral et al., 2015; Kennedy, Whiteman, & Williams, 2015; Paillé, Chen, Boiral, & Jin, 2014), which in turn, positively impacts the natural environment. For example, a reduction in an organization's consumption of materials that results from employees' aggregate conservation and recycling behaviors lowers greenhouse gas emissions by decreasing the need to extract, process and transport materials (Swim, Clayton, & Howard, 2011). Further, employees' conservation of energy lowers the amount of oil and natural gas an organization will burn for energy. Burning fossil fuels such as these is regarded as the largest anthropogenic contributor to global warming (National Research Council, 2010). In sum, OCBE is essential to organizational environmental performance.

A central tenant of the OCB framework is that, in the aggregate and over time, these behaviors indirectly contribute to organizational success through a variety of mechanisms (e.g., helping coordinate groups' work activities and facilitating organizations' ability to adapt to changing environments; Organ et al., 2006). Consistent with this framework, and OCBO in particular, we propose that in the aggregate, over time, OCBE indirectly impacts a firm's financial performance (i.e., organizational success) through their direct effect on its environmental performance. Specifically, we suggest that OCBE will contribute to financial performance by: (a) reducing resource expenditures (e.g., lower energy costs from employees turning equipment off), (b) helping organizations avoid costs related to environmental disasters (e.g., infractions to environmental regulations; Boiral, 2009), (c) creating a favorable external organizational image, which can attract investors and enhance access to capital markets (Beatty & Ritter, 1986), and (d) accessing different markets (Flammer, 2013). Significant empirical support for this argument comes from research that has linked a firm's environmental protection to its financial performance (e.g., Ambec & Lanoie, 2008; Flammer, 2013; Orlitzky, Schmidt, & Rynes, 2003). Further, research

has shown that workplace pro-environmental behaviors positively impact financial performance (e.g., Chen, Li, & Wong, 2002; Tam & Tam, 2008).

Finally, we suggest that OCBE will also benefit both the self and others (i.e., specific individuals), thereby making them consistent with OCBI. Drawing on the biophilia hypothesis (i.e., humans have an intrinsic need to affiliate with other living beings because of an evolutionary history of living in nature; Wilson, 1984) and recent research that has linked the amount of time spent in nature to pro-environmental behaviors (e.g., Zelenski, Dopko, & Capaldi, 2015) and individual happiness (e.g., Zelenski & Nisbet, 2012), we suggest that enacting OCBE will benefit the self by positively impact one's subjective well-being. The reason for this is because engaging in OCBE serves to protect the place to which humans are innately attached (i.e., nature), thereby developing future opportunities to interact with nature and, thus, fulfilling their innate need. Supporting this idea, pro-environmental behaviors have been linked to subjective well-being, satisfaction, and perceived happiness (e.g., Brown & Kasser, 2005; Corral-Verdugo, Mireles-Acosta, Tapia-Fonllem, & Fraijo-Sing, 2011). OCBE can also benefit individuals by having a positive impact on their health. For example, natural disasters such as heat waves are linked to increases in morbidity and mortality rates (Honda et al., 2014; Stanke, Kerac, Prudhomme, Medlock, & Murray, 2013) and depression, guilt and despair are associated with environmental issues (Doherty & Clayton, 2011). Accordingly, engaging in OCBE will indirectly mitigate the negative effects of environmental degradation on human health through their aggregate contributions to environmental preservation. Additionally, research has shown that engaging in pro-environmental behaviors such as using environmentally-friendly modes of transportation (e.g., cycling to work; Grabow et al., 2012) and bringing plants to the workplace (e.g., Fjeld, 2000) can positively impact individuals physical and mental health. Further, OCBE can benefit other employees. Williams and Anderson (1991) suggested that OCBI benefits others in the extent to which they involve helping other employees. We extend this notion to helping other employees engage in environmental initiatives at work (e.g., showing coworkers how to print double-sided). Doing so would help others experience the positive outcomes that result from engaging in OCBE.

In sum, we conceptualize workplace pro-environmental behaviors as a type of OCB that is consistent with the target-based framework. Based on this conceptualization, we drew upon best practices in scale development (e.g., DeVellis, 2003; Hinkin, 1998; Worthington & Whittaker, 2006) to develop and validate a measure of OCBE.

2. Scale development

We took a deductive and inductive approach to generate a pool of items. We first generated items based on prior OCBE theory (e.g., Boiral, 2009; Daily et al., 2009), our definition of OCBE and other workplace pro-environmental behavior measures (e.g., Bissing-Olson, Iyer, Fielding, & Zacher, 2013; Robertson & Barling, 2013). To ensure the adequacy of the items we generated through this deductive approach, and to generate additional items, we then followed an inductive approach by asking six doctoral students, all of whom had prior work experience, to provide examples of pro-environmental behaviors they engaged in, or saw others engage in at their previous jobs. Care was taken to ensure all items generated were not specific to any one type of job, organization or industry (e.g., an item assessing printing double-sided would only apply to office-based organizations), and encompassed general families of pro-environmental behaviors (e.g., "I conserve energy" versus "I turn off lights"). Through this process, a total of 30 items were generated.

To fine-tune the items and ensure face validity, we presented the items, along with our theoretical definition of OCBE, to the same group of doctoral students described above. The students were asked to ensure the items were clear, concise, matched our OCBE definition and represented behaviors that could be enacted across organizations, industries and jobs. We also asked the students to ensure the items

were not redundant. Items were deleted or combined if the students and authors collectively agreed that an item did not meet these criteria, resulting in 13 items being retained (see Table 1) for further psychometric assessment.

3. Study 1: content validity

We assessed the 13 items' content validity using the analysis of variance (ANOVA) approach (Hinkin & Tracey, 1999). Specifically, each OCBE item's mean rating was compared across three OCB theoretical definitions (i.e., OCBO, OCBI and OCBE) using a one-way ANOVA and Duncan's multiple range test.

3.1. Sample and procedure

80 undergraduate students (52.5% female, 16.3% did not report their gender) completed an online survey, in which they were required to read the newly developed OCBE items, items from Lee and Allen's (2002) OCBO and OCBI scales (e.g., "I express loyalty toward the organization"; "I help others who have been absent"), and the theoretical definitions of each items' corresponding construct. On a scale of 1 (*not at all*) to 5 (*completely*), the participants were asked to rate the extent to which they believed the items reflected each of the three definitions. Support for the items' content validity emerged if their mean ratings were significantly higher ($p < 0.05$) on the OCBE definition than the other two definitions.

3.2. Results

One of the items could not be differentiated in terms of the OCBE and OCBO definitions ($p > 0.05$), and thus, was deleted. All other OCBE items were classified correctly (see Table 1).

4. Study 2: construct validity: exploratory factor analysis and internal consistency

Next, as recommended by Hinkin (1998), we assessed the remaining 12 items' factor structure using an exploratory factor analysis (EFA). Through this analysis, we also deleted any items that further showed poor psychometric properties (i.e., low factor loadings or substantial cross-loadings). We followed this analysis with an assessment of internal consistency.

4.1. Method

4.1.1. Sample and procedure

554 full time employees from a variety of industries in the US were approached through Qualtrics Panel Services (Qualtrics, n.d.); 221 agreed to participate (response rate = 39.9%; M age = 39.6 years, $SD = 11.18$). Most participants were male (55.7%) and Caucasian (72.9%). 20.5% obtained a high school diploma, 26.4% had a college or technical diploma, and 52.7% had one or more university degrees. Participants worked on average 41 h per week ($SD = 8.26$) and had been in their position for an average of 8.5 years ($SD = 13.68$). Participants rated the 12 items that survived the content validity assessment in terms of frequency (1 = *never*; 5 = *always*). Maximum likelihood EFA with oblique rotation (direct oblimin), allowing for correlated factors was implemented using SPSS 22 (IBM corp., 2013).

4.2. Results

Inspecting the descriptive statistics of each item revealed that most respondents (53.25%) never compost at work (OCBE 1). This item was deleted, and the initial EFA was computed using the remaining 11 items. The results of the KMO test ($KMO = 0.93$; Kaiser-Meyer-Olkin; Kaiser, 1970) suggested that the data were appropriate for factor

Table 1
Study 1: content adequacy results (N = 80).

Item	Item description	F	OCBE M (SD)	OCBO M (SD)	OCBI M (SD)
OCBE1	At work, I compost organic material whenever possible.	59.84	4.00 (1.02)	2.51 (1.21)	2.29 (0.98)
OCBE2	At work, I recycle whenever possible.	67.93	4.37 (0.91)	2.83 (1.11)	2.65 (1.03)
OCBE3	I help my co-workers be environmentally friendly at work.	30.19	4.06 (0.88)	2.85 (1.18)	3.08 (1.05)
OCBE4	I conserve the amount of materials I use at work.	56.28	4.15 (0.89)	3.80 (1.08)	2.54 (1.04)
OCBE5	I encourage my coworkers to turn off work-related equipment when not in use.	27.26	3.88 (0.92)	3.19 (0.96)	2.73 (1.09)
OCBE6	I promote environmentally friendly behaviors amongst my coworkers.	27.51	3.95 (0.90)	2.85 (1.08)	3.10 (0.96)
OCBE7	I persuade my organization to purchase environmentally friendly products.	42.25	3.87 (1.04)	2.94 (1.07)	2.38 (1.00)
OCBE8	At work, I reduce the amount of energy I use.	68.22	4.03 (0.99)	3.45 (1.16)	2.16 (0.93)
OCBE9	I discuss with my leader how my organization can become more environmentally friendly.	35.67	3.84 (0.99)	3.30 (1.05)	2.50 (1.03)
OCBE10*	<i>I participate in environmentally friendly events that are sponsored by my organization.</i>	32.35	3.78 (0.93)	3.48 (1.15)	2.48 (1.10)
OCBE11	I suggest to my coworkers that they reduce the amount of materials they use.	21.97	3.85 (0.89)	3.15 (0.97)	2.89 (0.99)
OCBE12	I encourage my organization to support an environmental charity.	31.14	3.75 (0.99)	3.03 (1.11)	2.44 (1.04)
OCBE13	I encourage my organization to reduce its environmental impact.	39.64	3.95 (0.97)	3.27 (1.13)	2.46 (1.06)

Note: Boldface type denotes a significantly higher mean score ($p < 0.05$) mean score. An asterisk and italic type denote item means there were not significantly higher on the appropriate definition.

analysis. The initial EFA indicated that one item (OCBE 5) cross-loaded. We deleted this item and re-computed the EFA.

To determine the number of factors to extract we used several methods (i.e., eigenvalues > 1 ; scree plot; percentage of variance explained; likelihood ratio test statistic using difference tests; interpretability of solutions; Fabrigar & Wegener, 2012). These methods suggested a set of possible solutions ranging from one to three factors. Specifically, the eigenvalue (> 1.0) and the scree plot criteria indicated a two-factor solution accounting for 76.14% of the variance. An examination of the variance explained by each factor, however, indicated a one-factor solution, as the first factor (eigenvalue: 6.56) accounted for 65.59% of the variance, while, the second factor (eigenvalue: 1.06) only accounted for 10.56% of the variance. To determine if the second factor solution should be retained over a one-factor solution, we conducted the likelihood ratio test statistic using difference tests between the models. The results yielded a significant chi-square difference ($\Delta\chi^2/df = 189.16/11, p < 0.01$) suggesting the two-factor model significantly improves model fit. All items loaded highly on these two factors (> 0.5 ; see Table 2). As a final step, we evaluated the interpretability of the two-factor solution, which is regarded as a crucial and often deciding final step in determining the appropriate number of factors (Fabrigar & Wegener, 2012). For the most part, items loading on Factor 1 represented two distinct themes, (i.e., behaviors employees enact themselves and those aimed at influencing co-workers). Items loading on Factor 2 reflected OCBE aimed at helping the organization improve its environmental impact. Because items representing Factor 1 reflected two themes, we determined that a three-factor structure was the most interpretable, and based the internal consistency analysis on this factor solution ($\alpha = 0.73, 0.88, 0.92$).

Table 2
Study 2: exploratory factor analysis after deletion of two items (N = 221).

Items	Mean	SD	Communalities	Factor 1	Factor 2
OCBE6	3.21	1.15	0.82	0.83	0.10
OCBE2	3.70	1.21	0.43	0.73	-0.12
OCBE3	3.22	1.22	0.72	0.73	0.17
OCBE4	3.66	1.00	0.45	0.62	0.07
OCBE13	3.11	1.27	0.81	0.61	0.36
OCBE12	2.63	1.43	0.76	-0.14	0.96
OCBE9	2.71	1.36	0.86	-0.01	0.93
OCBE7	2.84	1.32	0.79	0.24	0.71
OCBE11	2.95	1.30	0.77	0.29	0.66
OCBE8	3.25	1.16	0.56	0.24	0.56
Eigenvalue				6.56	1.06
% of variance				65.59	10.56
% of cumulative variance				65.59	76.14%

5. Study 3: construct validity: confirmatory factor analysis, internal convergent validity and internal consistency

Because an EFA is most appropriately used for theory development about a measure's factor structure (Fabrigar & Wegener, 2012; Henson & Roberts, 2006), we conducted a confirmatory factor analysis (CFA) to confirm the hypothesized three factor-model of our scale, in which the first factor reflects OCBE that employees enact themselves (self-enacted OCBE), the second factor reflects OCBE aimed at influencing co-workers (co-worker OCBE), and the third factor comprises OCBE aimed at influencing the organization (organizational OCBE).

5.1. Method

5.1.1. Sample and procedure

Qualtrics Panel Services recruited a separate sample of 517 American adults who were employed full time in a variety of industries; 203 (39.3%) agreed to participate. On average, participants were 45.33 years ($SD = 12.21$; 50% male, 83.2% Caucasian). The average tenure of participants was 8.5 years ($SD = 9.11$) and they worked on average 42.31 h per week ($SD = 6.33$). 27.7% had a high school diploma or less, 28.2% had a college or technical diploma and 43.6% had a university degree or higher. Participants rated the 10 OCBE items that survived the EFA on a scale of 1 (*never*) to 5 (*always*).

5.2. Analyses and results

We contrasted six different models, namely a three-factor oblique model reflecting the proposed structure, three competing two-factor oblique models and a single factor unidimensional model. Importantly, we also compared our hypothesized three-factor model to a model that reflected the two-factor structure produced by the EFA (see Table 3). Analyses were estimated with maximum likelihood estimation as implemented in AMOS 22, and were based on the covariance matrix. To control for any threats from common method variance (CMV), we implemented the single method factor approach as prescribed by Podsakoff, MacKenzie, and Podsakoff (2012). To examine the internal convergent validity amongst the OCBE items for each factor, we used the average variance extracted (AVE) approach put forth by Fornell and Larcker (1981), which provides a measure of the shared variance among items in a latent variable.

The hypothesized three-factor oblique model (reflecting self-enacted, co-worker and organizational OCBE) provided an acceptable fit to the data: $\chi^2 (32, N = 203) = 120.376, p < 0.01; \chi^2/df = 3.76; CFI = 0.94; NFI = 0.92; PNFI = 0.54; RMSEA = 0.12; PCLOSE = 0.00$. These fit indices meet levels considered to indicate good fit (i.e., CFI and NFI above 0.90) recommended by Bentler (1990) and are close to

Table 3
Study 3: results of confirmatory factor analysis (N = 203).

	X ²	df	χ^2/df	CFI	NFI	PNFI	RMSEA	PCLOSE
Three factor (predicted model)	120.38	32	3.76	0.94	0.92	0.54	0.12	0.00
Two factor (a) (combining self-enacted OCBE and co-worker OCBE)	158.26	34	4.66	0.92	0.90	0.56	0.14	0.00
Two factor (b) (combining self-enacted OCBE and organizational OCBE)	157.13	34	4.62	0.92	0.90	0.56	0.13	0.00
Two factor (c) (combining co-worker and organizational OCBE)	197.85	34	5.82	0.89	0.87	0.54	0.15	0.00
One factor (combining all OCBEs)	299.13	36	8.31	0.83	0.81	0.53	0.19	0.00
EFA factor	164.39	34	4.84	0.91	0.89	0.55	0.14	0.00
Predicted model with common factor	42.95	22	1.95	0.99	0.97	0.39	0.07	0.15

Note: PCLOSE = test of RMSEA significance.

the acceptable thresholds (i.e., RMSEA between 0.08 and 0.10) stipulated by and MacCallum, Browne, and Sugawara (1996). All other models provided a poor fit to the data, and importantly, the three-factor oblique model provided a significantly better fit than all three two-factor models: Model A: $\Delta\chi^2(2, N = 203) = 37.88, p < 0.01$; Model B: $\Delta\chi^2(2, N = 203) = 36.76, p < 0.01$; Model C: $\Delta\chi^2(2, N = 203) = 77.48, p < 0.01$. The hypothesized three-factor model also provided a better fit than the single factor model, $\Delta\chi^2(4, N = 203) = 178.76, p < 0.01$, and the two-factor model suggested by the EFA, $\Delta\chi^2(2, N = 203) = 44.01, p < 0.01$ (see Table 3 for model fit and comparison statistics). Because Kelloway (1998) cautions that ideal absolute fit is rarely achieved, it is recommended to invariably focus on “comparing the fit of competing and theoretically plausible models” (p. 39).

Controlling for CMV improved model fit, $\Delta\chi^2(10, N = 203) = 77.43, p < 0.01$. All parameter estimates for the factor loadings, however, with or without the method factor, were significant ($p < 0.01$; see Table 4), suggesting that CMV does not distort the construct validity of our scale. Meeting Fornell and Larcker's (1981) requirement for convergent validity, the AVE values for all three OCBE sub-scales were >0.50 (see Table 4). The disattenuated correlation between self-enacted OCBE and co-worker OCBE was 0.86, between co-worker OCBE and organizational OCBE was 0.93, and between self-enacted OCBE and organizational OCBE was 0.74. Each of the three factors, self-enacted OCBE ($\alpha = 0.80$), co-worker OCBE ($\alpha = 0.88$) and organizational OCBE ($\alpha = 0.89$) were internally consistent. Due to the large correlations between the factors, all subsequent analyses were based on an overall measure.

6. Study 4: convergent, discriminant, concurrent and incremental concurrent validity

To further validate our measure, we assessed the convergent validity of our scale with Boiral and Paillé's measures of OCBE and its

Table 4
Study 3: standardized parameter estimates for the three-factor model.

Item	Self-enacted OCBE		Co-worker OCBE		Organizational OCBE	
	AVE = 0.57		AVE = 0.73		AVE = 0.68	
OCBE2	0.72**	0.67**				
OCBE3			0.84**	0.81**		
OCBE4	0.79**	0.77**				
OCBE6			0.90**	0.88**		
OCBE7					0.86**	0.86**
OCBE8	0.75**	0.81**				
OCBE9					0.84**	0.87**
OCBE11			0.81**	0.85**		
OCBE12					0.67**	0.68**
OCBE13					0.91**	0.91**

Note: Common method factor parameter estimates are italicized.
* $p < 0.05$; ** $p < 0.01$.

discriminant validity from OCBO and OCBI. We also examined concurrent and incremental concurrent validity with relevant outcomes.

With respect to convergent validity, we predicted that our scale should be positively related to Boiral and Paillé's (2012) three OCBE sub-scales (i.e., eco-initiatives, eco-helping and eco-civic engagement) because of the measures' partial conceptual and operational similarity. First, both scales were based on the general, albeit different, OCB framework, and as such, are derived from a similar conceptual foundation of workplace pro-environmental behavior as discretionary, unrewarded behavior that contributes to the organization. Second, both measures are comprised of three types of workplace pro-environmental behaviors that are similar in nature. Specifically, our scale and Boiral and Paillé's assess: a) individual pro-environmental initiatives (i.e., self-enacted OCBE and eco-initiatives), b) influential behaviors that seek to motivate co-workers to be more environmentally friendly (i.e., co-worker OCBE and eco-helping) and c) action oriented behaviors directed toward the organization (i.e., organizational OCBE and eco-civic engagement). Thus:

Hypothesis 1. *The new OCBE measure will be positively related to Boiral and Paillé's measures of OCBE.*

As a test of discriminant validity, we posited that our OCBE scale would be empirically distinct from measures of OCBO and OCBI. One could argue that OCBE, OCBO and OCBI represent the same overall construct because they all are based within the same target-based OCB framework, and all reflect discretionary behaviors that ultimately aim to promote the effective functioning of the organization. We predicted, however, that they represent independent constructs because the means through which they affect organizational effectiveness differs. While OCBO benefits the organization directly, OCBI indirectly affects organizational effectiveness through its immediate benefit to other employees. Likewise, by directly benefitting the natural environment, OCBE indirectly benefits the organization, primarily through its impact on financial performance (see above). Indirect support for our argument comes from research that has shown OCBO and OCBI, albeit conceptually similar, are empirically distinct constructs (e.g., Lee & Allen, 2002; Williams & Anderson, 1991). Hence:

Hypothesis 2. *The OCBE measure will be empirically distinct from OCBO and OCBI.*

As previously noted, engaging in pro-environmental behaviors outside the work context results in positive outcomes, including subjective well-being (Brown & Kasser, 2005; Kasser & Sheldon, 2002). Given that OCBE reflects a type of pro-environmental behavior, we hypothesized that the new measure would be positively related to subjective well-being. Specifically, drawing on the biophilia hypothesis (see above; Wilson, 1984), we posited that engaging in workplace pro-environmental behaviors protects the place (i.e., nature) that fulfills human's innate desire. Thus, enacting OCBE will make individuals feel good because

doing so protects the environment, and therefore, helps ensure that humans will continue to be able to spend time in nature, which in turn, fulfills their innate need. Moreover, we suggest that when individuals engage in workplace pro-environmental behaviors they feel proud, happy and satisfied (components of subjective well-being; Pavot & Diener, 1993) because (a) they can make a difference in the quality of the natural environment and (b) the positive environmental outcomes of their behaviors are something of which they can be proud. Supporting this argument, empirical research has shown that individuals report gains in personal satisfaction (an important component of subjective well-being; Pavot & Diener, 1993) from engaging in pro-environmental behaviors both at home and at work (e.g., Lee & De Young, 1994; Oskamp et al., 1991). Therefore:

Hypothesis 3. *The OCBE measure will be significantly related to subjective well-being.*

Because our new scale was developed based on a separate OCB framework from that used by Boiral and Paillé (2012), and because we believe our scale assesses aspects of workplace pro-environmental behaviors that Boiral and Paillé's sub-scales do not capture (see above), it was necessary to determine if our scale uniquely and incrementally contributes to explaining variance in subjective well-being above and beyond Boiral and Paillé's measures. Thus:

Hypothesis 4. *The new OCBE measure will be significantly related to subjective well-being after controlling for the effects of Boiral and Paillé's (2012) OCBE scale.*

6.1. Method

6.1.1. Sample and procedure

In line with Hinkin's (1998) recommendation, we used the same sample that was used in Study 3. In addition to completing the 10-item OCBE measure, participants rated Boiral and Paillé's (2012) three OCBE scales (e.g., "I stay informed of my company's environmental initiatives"; "I voluntarily carry out environmental actions and initiatives in my daily work activities") and Lee and Allen's (2002) OCBO and OCBI scales (see study 1 for exemplary items) on a scale of 1 (*never*) to 5 (*always*). Participants also completed the 5-item Satisfaction with Life Scale (Pavot & Diener, 1993), which asks participants to report their agreement with items on a scale of 1 (*strongly disagree*) to 5 (*strongly agree*). Sample items include "I am satisfied with my life" and "The conditions of my life are excellent."

6.2. Analyses and results

To assess convergent, concurrent and incremental concurrent validity, zero-order correlations and a hierarchical regression were computed in SPSS 22 (IBM corp., 2013). With respect to the hierarchical regression, we entered Boiral and Paillé's (2012) overall OCBE scale in Step 1 and then added our overall OCBE scale into the equation in Step 2. The overall score from Boiral and Paillé's measure was preferred because using the individual dimensions raises issues of multicollinearity (i.e., correlations between the three dimensions are >0.80). To test discriminant validity, we used the AVE approach, which provides evidence for discriminant validity by demonstrating that the focal variable has more internal variance than variance shared between the focal variable and other theoretically relevant variables (Fornell & Larcker, 1981). Specifically, we conducted a CFA in Amos 22 in which we specified a three-factor model (reflecting OCBE, OCBO and OCBI as separate but related) to obtain the necessary statistics (i.e., regression estimates and disattenuated correlations) to calculate the AVE and compared it against the squared multiple disattenuated correlations between the three OCB variables. To examine the influence of CMV in the current study, we used Lindell and Brandt's (2000)

marker variable approach (see also Lindell & Whitney, 2001). To do so, we asked participants to indicate the order in which they were born (i.e., a variable that is not theoretically related to the studied variables), and used this as a marker variable. The influence of CMV was assessed by partialling the smallest positive correlation between birth order and the other studied variables (in this case the correlation with eco-civic engagement, $r = 0.01$; see Table 5) out of the correlations between the OCBE scale and all the other variables. If the observed correlations remain significant, it can be concluded that CMV does not significantly inflate validity relationships, and therefore, does not pose a threat (Lindell & Whitney, 2001).

Descriptive data, scale reliabilities and intercorrelations appear in Table 5.

Providing support for Hypothesis 1, OCBE was highly correlated with Boiral and Paillé's measures of eco-initiatives ($r = 0.79$, $p < 0.01$), eco-helping ($r = 0.78$, $p < 0.01$) and eco-civic engagement ($r = 0.73$, $p < 0.01$). Meeting Fornell and Larcker's (1981) requirement for discriminant validity, the AVE for OCBE (0.59) was greater than the squared disattenuated correlations between OCBE and OCBO (0.21) and OCBE and OCBI (0.22), thereby supporting Hypothesis 2. In support of Hypothesis 3, the OCBE measure was significantly correlated with subjective well-being ($r = 0.30$, $p < 0.01$). Last, consistent with Hypothesis 4, after controlling for Boiral and Paillé's global OCBE measure ($\beta = 0.245$, $p < 0.01$; adjusted $R^2 = 0.06$), entering the new OCBE measure explained a further 3% of the variance in subjective well-being ($\beta = 0.292$, $p < 0.01$; adjusted $R^2 = 0.08$; see Table 6). The marker variable approach revealed that CMV does not pose a threat to the data.

7. Study 5: nomological validity

To test the nomological validity of our OCBE scale, we first predicted that our measure will be negatively related to beliefs that pro-environmental behaviors are inconvenient. According to goal framing theory (Lindenberg & Steg, 2007), goals frame how we process information and dictate which behavioral alternative we chose in a given situation. The goal that is focal will determine which behavior is chosen. When gain goals (i.e., goals that focus on guarding and improving resources) are focal, individuals will concentrate on the costs and benefits of behavioral alternatives and choose the option with the lowest costs (Ruepert, Steg, & Keizer, 2015). Drawing from this theory, we suggest that when employees believe that pro-environmental behaviors are inconvenient their gain goals are focal because such beliefs focus on the costs associated with pro-environmental behavior (McCarty & Shrum, 2001). As a result, employees will be less likely to enact OCBE. Supporting this rationale, there is a negative association between the belief that recycling is inconvenient and recycling behaviors (e.g., McCarty & Shrum, 2001; Vining & Ebreo, 1990), and research has found that when barriers that make engaging in pro-environmental behaviors inconvenient are reduced, individuals engage in higher levels of those behaviors (see Osbaldiston & Schott, 2012 for a review). Thus:

Hypothesis 1. *The OCBE measure will be negatively related to beliefs that pro-environmental behaviors are inconvenient.*

Nomological validity is also inferred from positive relationships with relevant correlates. Accordingly, we posited that the new OCBE measure would be positively related to employees' safety consciousness at work because both of these constructs share a similar foundation: they are serious organizational issues that involve a concern for the other (i.e., employees and the environment) that can result in devastating outcomes. Further, in several instances pro-environmental behaviors have implications for occupational health and safety, and therefore, may be more frequently enacted amongst employees who are aware of safety issues and know which behaviors contribute to occupational safety (i.e., safety conscious; Barling, Loughlin, & Kelloway, 2002). For example, safety conscious employees may be less likely to leave machinery running

Table 5
Study 4: descriptive statistics, intercorrelations and reliabilities for all scales (N = 203).

Variable	M	SD	1	2	3	4	5	6	7	8
1. OCBE	2.68	0.96	0.93							
2. Eco-initiatives	2.38	1.12	0.79**	0.87						
3. Eco-helping	2.14	1.05	0.78**	0.84**	0.93					
4. Eco-civic engagement	2.11	1.08	0.73**	0.83**	0.84**	0.91				
5. OCBO	3.53	0.88	0.48**	0.46**	0.47**	0.48**	0.91			
6. OCBI	3.66	0.74	0.46**	0.41**	0.43**	0.40**	0.53**	0.87		
7. SWB	3.18	0.90	0.30**	0.23**	0.25**	0.22**	0.38**	0.24**	0.89	
8. Birth order	2.51	2.32	0.07	0.09	−0.01	0.01	−0.04	−0.08	−0.03	0.89

Note: SWB = Subjective well-being. Reliabilities are on the diagonal.
*p < 0.05; **p < 0.01.

when not in use because of the potential safety risks of doing so. Turning off equipment when not in use is considered a workplace pro-environmental because of its implications for the natural environment (Ones & Dilchert, 2012). Given this overlap, it is perhaps not surprising that some scholars advocate for the integration of health and safety and environmental management systems (e.g., Duijm, Fiévez, Gerbec, Hauptmanns, & Konstandinidou, 2008; Honkasalo, 2000), and research has found enhanced environmental performance when occupational health and safety and environmental sustainability are integrated (del Brío, Junquera, & Ordiz, 2008). On this basis, we hypothesized:

Hypothesis 2. *The OCBE measure will be positively related to safety consciousness.*

Finally, we predicted that the OCBE scale should be positively related to affective organizational commitment, defined as an “emotional attachment to, identification with and involvement in the organization” (Meyer, Stanley, Herscovitch, & Topolnytsky, 2002, p. 21). According to Mesmer-Magnus, Viwsevaran, and Wiernik (2012), employees who are committed to their organization are more inclined to identify and become involved with a number of organizational initiatives, including those that seek to improve environmental performance. Moreover, when employees are committed to their organization, they are more likely to devote their energy to work tasks that are not formally required, such as corporate greening initiatives (Temminck, Mearns, & Fruhen, 2015). As a result, they are more likely to act in ways that support these initiatives, such as engaging in OCBE. Supporting these claims, research has found a link between organizational commitment and general OCBs (e.g., Chiaburu & Harrison, 2008; Nielsen, Hrivnak, & Shaw, 2009), while more recently, affective organizational commitment has been linked to workplace pro-environmental behaviors (Temminck et al., 2015; Lamm, Tosti-Kharas, & Williams, 2013). Hence:

Hypothesis 3. *The OCBE scale will be positively related to organizational commitment.*

7.1. Method

7.1.1. Sample and procedure

All participants were employed in the hospitality industry and obtained through two different sources: (a) recruitment flyers posted in

Table 6
Study 4: regression analysis of incremental concurrent validity predicting subjective well-being (N = 203).

Predictor	Model 1			Model 2		
	B	SE	β	B	SE	β
Boiral and Paillé OCBE	0.22*	0.06	0.25*	0.01	0.10	0.01
New OCBE				0.27*	0.11	0.29*
ΔR ²		0.06*			0.03*	

* p < 0.01.

several hotels and on social media websites and (b) through SocialSci, an online panel service (www.socialsci.com, 2013). The sample consisted of 114 participants (68.4% female; 86% Caucasian), most of whom were between 18 and 35 years of age (71.1%). Participants had been with their organization for an average of four years (SD = 5.92). 2.6% of participants did not complete high school, 36.8% of participants' highest level of education achieved was a high school diploma, while 60.5% had a college diploma or higher.

Participants completed an online survey in which they answered several measures in terms of agreement (1 = strongly disagree, 5 = strongly agree). To assess participants' beliefs that pro-environmental behaviors are inconvenient, we used McCarty and Shrum's (2001) two item measure of the belief that recycling is inconvenient. To supplement these items, we generated four items reflecting the belief that conservation behaviors and pro-environmental behaviors, in general, are inconvenient (see the Appendix for the full measure). Barling et al.'s (2002) seven-item scale (e.g., “I am well aware of the safety risks involved in my job;” “I do not use equipment that I feel is unsafe”) was used to measure safety consciousness. Finally, we measured organizational commitment using Allen and Meyer's (1990) eight-item affective organizational commitment scale. Sample items include: “I would be very happy to spend the rest of my career with this organization” and “I do not feel emotionally attached to this organization”.

7.2. Analyses and results

Descriptive data, scale reliabilities and intercorrelations for all variables appear in Table 7. To assess nomological validity, we computed zero-order correlations. To test for CMV, the marker variable approach was again implemented by using birth order as a marker variable (see above). Results from this test revealed that CMV does not pose a threat to the data. In support of our hypotheses, the OCBE measure was negatively correlated with beliefs that pro-environmental behaviors are inconvenient (r = −0.23, p < 0.05) and positively related to safety consciousness (r = 0.34, p < 0.01) and organizational commitment (r = 0.43, p < 0.01).

Table 7
Study 5: descriptive statistics, intercorrelations and reliabilities for all scales (N = 114).

Variable	M	SD	1	2	3	4	5
1. OCBE	2.98	0.97	0.93				
2. Inconvenient	2.34	0.73	−0.23*	0.76			
3. Safety consciousness	4.32	0.59	0.34**	0.03	0.76		
4. Commitment	3.15	0.89	0.43**	−0.11	0.34**	0.87	
5. Birth order	1.81	1.15	0.12	0.10	0.06	−0.03	−

Note: Inconvenient = beliefs that pro-environmental behaviors are inconvenient. Reliabilities are on the diagonal.

* p < 0.05.
** p < 0.01.

8. Study 6: test-retest reliability

Finally, to provide information on the scale's temporal stability, we assessed the test-retest reliability of the OCBE measure.

8.1. Method

8.1.1. Sample and procedure

Recruitment notices were sent to 100 administrative employees employed at a medium-sized business school. 34 participants completed all three surveys (M age = 36.82 years, SD = 7.79; 91.1% female; 94% of participants had a college education or higher). Participants worked on average 37.12 h per week (SD = 5.61) and they had been in their current position for an average of 2.9 years (SD = 3.64). Following recommendations for assessing test-retest reliability (e.g., Leong & Austin, 2006), participants were asked to complete the OCBE measure three times each separated by a two week time period.

8.2. Analyses and results

We assessed the test-retest reliability of the OCBE scale by correlating Time 1 with Time 2 scores (r_{12}), Time 2 with Time 3 scores (r_{23}) and Time 1 with Time 3 scores (r_{13}). We also computed the average of all three correlations. To account for changes that may occur between time points and measurement error, we used Heise's (1969) formula to assess the corrected test-retest reliability. Results from the uncorrected ($r_{12} = 0.83$; $r_{23} = 0.90$; $r_{13} = 0.82$; average $r = 0.85$) and corrected ($r = 0.91$) analyses demonstrated that the OCBE scale was temporally stable.

9. Discussion and implications

Our goals in this research were to (a) conceptualize workplace pro-environmental behaviors as a form of OCB (OCBE) that fits within the target-based framework, (b) develop and refine a new and more comprehensive measure of OCBE based on this framework that is applicable to a variety of jobs, organizations and industries, (c) assess the scale's psychometric validity and (d) compare its conceptual and psychometric properties with an alternative measure (e.g., Boiral & Paillé, 2012). To this end, we conducted six studies, which resulted in a reliable and valid measure that incrementally predicts relevant outcomes. Using multiple independent samples from a variety of industries enhances the generalizability of our findings.

The scale development process initially resulted in 13 items that reflect the theoretical definition of OCBE and generalize across different types of jobs. These 13 items were then analyzed for content validity (Study 1). All but one of the items yielded adequate content validity. After deleting this item, the remaining 12 items evidenced satisfactory content validity, pointing to the theoretical distinctiveness of the OCBE construct from OCBO and OCBI. After deleting two more items (one represented a behavior that most participants do not enact, while the other cross-loaded), results from the EFA (Study 2) supported a 10-item, two-factor OCBE measure. Examining the interpretability of this factor solution suggested a three-factor model, with the first factor reflecting self-enacted OCBE. The second factor comprised co-worker focused OCBE, while the third factor reflected organizationally-focused OCBE. A CFA (Study 3) confirmed the hypothesized three-factor structure, which provided a significantly better fit to the data than the model produced by the EFA and several competing models. All three factors demonstrated good internal convergent validity.

Self-enacted OCBE represents behaviorally-based workplace pro-environmental behaviors that individuals enact themselves without any intentional influence on others. Examples of these behaviors include recycling and conservation behaviors. Co-worker focused OCBE is directed at influencing and helping co-workers to be more environmentally-friendly at work, while organizationally-focused OCBE reflect

behaviors aimed at influencing the organization to improve its environmental performance. Types of behaviors that comprise co-worker OCBE include promoting environmental initiatives amongst coworkers and suggesting to them that they engage in pro-environmental behaviors. Engaging in organizational OCBE, on the other hand, entails encouraging the organization to reduce its environmental impact and discussing with management ways in which the organization can enhance its environmental performance. In short, OCBE are multifaceted behaviors that can be enacted in different ways.

Next, the convergent, discriminant, concurrent, incremental concurrent and nomological validity of the OCBE measure was assessed (Study 4 and 5). Results from our analyses of the convergent relationships between our measure and Boiral and Paillé's scales provided support for the convergent validity of our measure. In terms of discriminant validity, our analyses indicated that our OCBE measure is related to but empirically distinguishable from measures of OCBO and OCBI. The new OCBE measure also demonstrated concurrent validity as it was positively related to subjective well-being. This finding supports one of our central theoretical tenants that OCBE benefits specific individuals, and therefore, is consistent with OCBI. Moreover, a test of incremental concurrent validity revealed that OCBE as operationalized by our measure incrementally contributes to explaining variance in subjective well-being above and beyond Boiral and Paillé's operationalization of OCBE, thereby providing initial support for the empirical superiority of our measure. With regards to nomological validity, as predicted, OCBE was significantly negatively related to beliefs that pro-environmental behaviors are inconvenient and positively related to safety consciousness and affective organizational commitment. These findings provide some insight into the nomological network of OCBE.

Finally, results from three internal consistency analyses and a test-retest reliability analysis suggest that the OCBE scale demonstrates internal and temporal stability. Temporal consistency tends to be neglected in scale development, but provides greater confidence in the stability of the measure. Thus, examining it in the current research is a strength of this study.

Our findings offer several theoretical contributions. First, our study brings conceptual clarity and insight into the nature of OCBE as a multidimensional construct that is comprised of self-enacted, co-worker and organizational OCBE, thereby providing a basis for theorizing about the different predictors and outcomes of the three dimensions. For example, given that co-worker and organizational OCBE are influence-based, they may be better predicted by persuasion variables (e.g., promotive extra-role behaviors; Van Dyne & LePine, 1998) than self-enacted OCBE, which may be more highly correlated with self-efficacy (Bandura, 1982), due to their self-directed nature. Future research should investigate the different antecedents and outcomes of the three factors. While our analyses and conceptualization of OCBE point to a multidimensional measure, which is consistent with other conceptualizations of workplace pro-environmental behaviour (e.g., Bissing-Olson et al., 2013; Boiral & Paillé, 2012; Norton, Parker, Zacher, & Ashkanasy, 2015), the high correlations between the three dimensions suggest that, in some cases, future research might benefit from using an overall measure.

Second, the present findings move beyond Boiral and Paillé's (2012) research by providing a target-based framework for researching OCBE, and subsequently, developing a measure that reflects this framework. Specifically, co-worker and organizational OCBE are consistent with Williams and Anderson's sub-dimensions because each of the OCBE sub-dimensions are targeted at individuals and the organization, respectively, while self-enacted OCBE is also target based (i.e., targeted at the natural environment). Moreover, the theoretical basis for all three OCBE dimensions suggests that they directly and indirectly benefit the environment, specific individuals and organizations. In doing so, the current research extends OCB theory to the environmental context and links a well-established body of literature to a nascent, yet growing area (i.e., workplace pro-environmental behaviors) from which hypotheses regarding the predictors and outcomes of OCBE can be generated.

Specifically, future research could consult the large body of literature pointing to the antecedents and consequences of OCBO and OCBI (e.g., Organ et al., 2006; Podsakoff et al., 2009; Spitzmuller et al., 2008) for guidance in determining those of OCBE, as well as isolate potential mediating variables linking the predictors to OCBE, and the boundary conditions to them.

Last, this research has provided a new, reliable and valid tool to measure workplace pro-environmental behaviors that can be used in future research. Further, by including items that assess specific workplace pro-environmental behaviors (e.g., recycling, conservation), our measure provides deeper insight into the types of behaviors that comprise OCBE and the extent to which employees engage in them compared to Boiral and Paillé's scale. It is important to note that in some cases, albeit few, the pro-environmental behaviors assessed by our measure may not be discretionary in all organizational settings (i.e., some organizations may require employees to recycle or conserve energy). Thus, future research should instruct participants in the stem of our measure to rate the extent to which they *voluntarily* engage in each behavior.

Findings from our research also offer several managerial implications. Our research provides managers with potentially important information about the types of workplace pro-environmental behaviors they should encourage amongst their employees to improve their organization's environmental performance. Likewise, given that leaders' model pro-environmental behaviors amongst employees (Robertson & Barling, 2013), the present results can be used by managers to guide their own OCBE in an attempt to influence the same behaviors amongst subordinates. Finally, because our OCBE scale includes broad items that assess workplace pro-environmental behaviors that are not specific to any type of job, organization or industry, our measure can be used in organizations across various contexts. For example, organizations can use the scale to gauge the frequency and nature of OCBE, which in turn, can be used to gain a better understanding of how employees support and contribute to corporate environmental sustainability. The relative brevity of the scale enhances its likely use.

10. Limitations and conclusions

Several limitations of our research warrant mention. The first limitation of this research stems from our reliance on self-report data. Concern that conclusions are affected by CMV can be allayed as it was shown in Studies 3, 4 and 5 CMV did not adversely affect the psychometric acceptability of the scale. A second limitation stems from our inability to demonstrate the empirical superiority of our scale over Boiral and Paillé's measure at more steps in the validation process. The refinement of any measure is an on-going process that requires several studies to show empirical superiority of one measure of another over time. Thus, we recommend that future research compare the predictive validity of both measures over time. A third possible limitation of this research relates to the generalizability of one item (i.e., "I discuss with my leader how my organization can become more environmentally friendly"), as this item may not be relevant to the self-employed who have no leader with whom to discuss environmental issues. While it remains for future research to ensure the generalizability of the items to different employment arrangements, our current measure is appropriate for the large majority of the workforce.

To conclude, for future research on workplace pro-environmental behaviors to flourish, a unifying framework and fully validated comprehensive measure is needed. To this end, our research extended initial work by conceptually locating these behaviors within the target-based framework of OCB, and developing a new comprehensive, reliable, valid and temporally stable measure that is precise yet general in nature.

Acknowledgements

The authors greatly acknowledge grants from the Social Science and Humanities Research Council of Canada (Grant numbers: 752-2011-

1922; 435-2012-1737) and Western University's Faculty of Social Science Faculty Directed Research Fund.

Appendix A. Beliefs that pro-environmental behaviors are inconvenient scale (items adapted and generated from McCarty & Shrum, 2001)

1. Recycling cans, bottles and newspapers, etc., is inconvenient.
2. I hate having to wash out bottles for recycling.
3. Conserving materials, energy, etc., is inconvenient.
4. I hate remembering to turn off lights, computers, etc., to conserve energy/materials.
5. Engaging in pro-environmental behaviors is inconvenient.
6. I hate the time and effort it takes to engage in pro-environmental behaviors.

References

- Allen, N. J., & Meyer, J. P. (1990). The measurement and antecedents of affective, continuance and normative commitment to the organization. *Journal of Occupational Psychology*, 63, 1–18.
- Ambec, S., & Lanoie, P. (2008). Does it pay to be green? A systematic overview. *Academy of Management Perspectives*, 22, 45–62.
- Bandura, A. (1982). Self-efficacy mechanism in human agency. *American Psychologist*, 37, 122–147.
- Barling, J., Loughlin, C., & Kelloway, E. K. (2002). Development and test of a model linking safety-specific transformational leadership and occupational safety. *Journal of Applied Psychology*, 87(488).
- Beatty, R. P., & Ritter, J. R. (1986). Investment banking, reputation, and the underpricing of initial public offerings. *Journal of Financial Economics*, 15, 213–232.
- Bentler, P. M. (1990). Comparative fit indexes in structural models. *Psychological Bulletin*, 107, 238–246.
- Bissing-Olson, M. J., Iyer, A., Fielding, K. S., & Zacher, H. (2013). Relationships between daily affect and pro-environmental behavior at work: The moderating role of pro-environmental attitude. *Journal of Organizational Behavior*, 34, 151–171.
- Boiral, O. (2009). Greening the corporation through organizational citizenship behaviors. *Journal of Business Ethics*, 87, 221–236.
- Boiral, O., & Paillé, P. (2012). Organizational citizenship behavior for the environment: Measurement and validation. *Journal of Business Ethics*, 109, 431–445.
- Boiral, O., Paillé, P., & Raineri, N. (2015). The nature of employees' pro-environmental behaviors. In J. L. Robertson, & J. Barling (Eds.), *The Psychology of Green Organizations* (pp. 12–32). New York: Oxford University Press.
- Brown, K. W., & Kasser, T. (2005). Are psychological and ecological well-being compatible? The role of values, mindfulness and lifestyle. *Social Indicators Research*, 74, 349–368.
- Chen, Z., Li, H., & Wong, C. T. (2002). An application of bar-code system for reducing construction wastes. *Automation in Construction*, 11, 521–533.
- Chiaburu, D. S., & Harrison, D. A. (2008). Do peers make the place? Conceptual synthesis and meta-analysis of coworker effects on perceptions, attitudes, OCBs, and performance. *Journal of Applied Psychology*, 93, 1082–1103.
- Corral-Verdugo, V., Mireles-Acosta, J., Tapia-Fonllem, C., & Fraijo-Sing, B. (2011). Happiness as a correlate of sustainable behaviors: A study of pro-ecological, frugal, equitable and altruistic actions that promote subjective wellbeing. *Human Ecology Review*, 18, 95–104.
- Daily, B. F., Bishop, J. W., & Govindarajulu, N. (2009). A conceptual model for organizational citizenship behavior directed toward the environment. *Business & Society*, 48, 243–256.
- Decoster, S., Stouten, J., Camps, J., & Tripp, T. M. (2014). The role of employees' OCB and leaders' hindrance stress in the emergence of self-serving leadership. *The Leadership Quarterly*, 25, 647–659.
- del Brío, J. A., Junquera, B., & Ordiz, M. (2008). Human resources in advanced environmental approaches—a case analysis. *International Journal of Production Research*, 46, 6029–6053.
- DeVellis, R. F. (2003). *Scale Development: Theory and Applications* (2nd ed.). CA: Sage.
- Doherty, T. J., & Clayton, S. (2011). The psychological impacts of global climate change. *The American Psychologist*, 66, 265–276.
- Duijijm, N. J., Fiévez, C., Gerbec, M., Hauptmanns, U., & Konstandinidou, M. (2008). Management of health, safety and environment in process industry. *Safety Science*, 46, 908–920.
- Fabrigar, L. R., & Wegener, D. T. (2012). *Exploratory Factor Analysis: Understanding Statistics*. New York: Oxford University Press.
- Ferris, D. L., Lian, H., Beown, D. J., & Morrison, R. (2015). Ostracism, self-esteem and job performance: When do we self-verify and when do we self-enhance? *Academy of Management Journal*, 58, 279–297.
- Fjeld, T. (2000). The effect of interior planting on health and discomfort among workers and school children. *HortTechnology*, 10(1), 46–52.
- Flammer, C. (2013). Corporate social responsibility and shareholder reaction: The environmental awareness of investors. *Academy of Management Journal*, 56, 758–781.
- Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, 18, 39–50.
- Ghiselli, E. E., Campbell, J. P., & Zedeck, S. (1981). *Measurement Theory for the Behavioral Sciences*. San Francisco: W.H. Freeman.

- Grabow, M. L., Spak, S. N., Holloway, T., Stone, B., Jr., Mednick, A. C., & Patz, J. A. (2012). Air quality and exercise-related health benefits from reduced car travel in the midwestern United States. *Environmental Health Perspectives*, 120, 68–76.
- Heise, D. R. (1969). Separating reliability and stability in test-retest correlation. *American Sociological Review*, 34, 93–101.
- Henson, R. K., & Roberts, J. K. (2006). Use of exploratory factor analysis in published research: Common errors and some comment on improved practice. *Educational and Psychological Measurement*, 66, 393–416.
- Hinkin, T. R. (1998). A brief tutorial on the development of measures for the use in survey questionnaires. *Organizational Research Methods*, 1, 104–121.
- Hinkin, T. R., & Tracey, J. B. (1999). An analysis of variance approach to content validation. *Organizational Research Methods*, 2, 175–186.
- Honda, Y., Kondo, M., McGregor, G., Kim, H., Guo, Y. L., Hijioka, Y., & Kovats, R. S. (2014). Heat-related mortality risk model for climate change impact projection. *Environmental Health and Preventive Medicine*, 19, 56–63.
- Honkasalo, A. (2000). Occupational health and safety and environmental management systems. *Environmental Science & Policy*, 3, 39–45.
- IBM Corp (2013). *IBM SPSS Statistics for Windows, Version 22.0*. Armonk, NY: IBM Corp.
- Kaiser, H. F. (1970). A second-generation little jiffy. *Psychometrika*, 39, 31–36.
- Kasser, T., & Sheldon, K. M. (2002). What makes for a merry Christmas? *Journal of Happiness Studies*, 3, 313–329.
- Kelloway, E. K. (1998). *Using LISREL for Structural Equation Modeling: A Researcher's Guide*. Thousand Oaks, CA: Sage Publications.
- Kennedy, S., Whiteman, G., & Williams, A. (2015). Sustainable innovation at interface: Workplace pro-environmental behavior as a collective driver for continuous improvement. In J. L. Robertson, & J. Barling (Eds.), *The Psychology of Green Organizations* (pp. 351–377). New York: Oxford University Press.
- Lamm, E., Tosti-Kharas, J., & Williams, E. G. (2013). Read this article, but don't print it: Organizational citizenship behavior toward the environment. *Group & Organization Management*, 38, 163–197.
- Lee, K., & Allen, N. J. (2002). Organizational citizenship behavior and workplace deviance: The role of affect and cognitions. *Journal of Applied Psychology*, 87, 131–142.
- Lee, Y. J., & De Young, R. (1994). Intrinsic satisfaction derived from office recycling behavior: A case study in Taiwan. *Social Indicators Research*, 31(1), 63–76.
- Leong, F. T., & Austin, J. T. (2006). *The Psychology Research Handbook: A Guide for Graduate Students and Research Assistants*. Thousand Oaks: Sage Publications.
- Lindell, M. K., & Brandt, C. J. (2000). Climate quality and climate consensus as mediators of the relationship between organizational antecedents and outcomes. *Journal of Applied Psychology*, 85, 331–348.
- Lindell, M. K., & Whitney, D. J. (2001). Accounting for common method variance in cross-sectional research designs. *Journal of Applied Psychology*, 86, 114–121.
- Lindenberg, S., & Steg, L. (2007). Normative, gain and hedonic goal frames guiding environmental behavior. *Journal of Social Issues*, 63(1), 117–137.
- MacCallum, R. C., Browne, M. W., & Sugawara, H. M. (1996). Power analysis and determination of sample size for covariance structure modeling. *Psychological Methods*, 1, 130.
- McCarty, J. A., & Shrum, L. J. (2001). The influence of individualism, collectivism, and locus of control on environmental beliefs and behavior. *Journal of Public Policy & Marketing*, 20, 93–104.
- Mesmer-Magnus, J., Viwsevaran, C., & Wiernik, B. M. (2012). The role of commitment in bridging the gap between organizational sustainability and environmental sustainability. In S. E. Jackson, D. S. Ones, & S. Dilchert (Eds.), *Managing Human Resources for Environmental Sustainability* (pp. 155–186). San Francisco, CA: Jossey-Bass.
- Meyer, J. P., Stanley, D. J., Herscovitch, L., & Topolnitsky, L. (2002). Affective, continuance, and normative commitment to the organization: A meta-analysis of antecedents, correlates, and consequences. *Journal of Vocational Behavior*, 61, 20–52.
- National Research Council (2010). *Advancing the science of climate change*. Washington, DC: National Academies Press.
- Nielsen, T. M., Hrivnak, G. A., & Shaw, M. (2009). Organizational citizenship behavior and performance: A meta-analysis of group-level research. *Small Group Research*, 40, 555–577.
- Norton, T. A., Parker, S. L., Zacher, H., & Ashkanasy, N. M. (2015). Employee green behavior: A theoretical framework, multilevel review and future research agenda. *Organization & Environment*, 28, 103–125.
- Ones, D. S., & Dilchert, S. (2012). Environmental sustainability at work: A call to action. *Industrial and Organizational Psychology*, 5, 444–466.
- Organ, D. W. (1988). *Organizational Citizenship Behavior: The Good Soldier Syndrome*. Lexington, MA: Lexington Books.
- Organ, D. W., Podsakoff, P. M., & MacKenzie, S. B. (2006). *Organizational Citizenship Behavior: Its Nature, Antecedents and Consequences*. CA: Sage Publications.
- Orlitzky, M., Schmidt, F. L., & Rynes, S. L. (2003). Corporate social and financial performance: A meta-analysis. *Organization Studies*, 24, 403–441.
- Osbaldiston, R., & Schott, J. P. (2012). Environmental sustainability and behavioral science: Meta-analysis of proenvironmental behavior experiments. *Environment and Behavior*, 44, 257–299.
- Oskamp, S., Harrington, M. J., Edwards, T. C., Sherwood, D. L., Okuda, S. M., & Swanson, D. C. (1991). Factors influencing household recycling behavior. *Environment and Behavior*, 23(4), 494–519.
- Paillé, P., Chen, Y., Boiral, O., & Jin, J. (2014). The impact of human resource management on environmental performance: An employee-level study. *Journal of Business Ethics*, 121, 451–466.
- Pavot, W., & Diener, E. (1993). Review of the satisfaction with life scale. *Psychological Assessment*, 5, 164–172.
- Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, 65, 539–569.
- Podsakoff, P. M., Whiting, S. W., Podsakoff, P. M., & Blume, B. D. (2009). Individual and organizational level consequences of organizational citizenship behaviors: A meta-analysis. *Journal of Applied Psychology*, 94, 122–141.
- Qualtrics. (n.d.). Qualtrics Panels Overview. (Retrieved from <http://www.qualtrics.com/surveypanels> on May 14, 2011).
- Robertson, J. L., & Barling, J. (2013). Greening organizations through leaders' influence on employees' pro-environmental behaviors. *Journal of Organizational Behavior*, 34, 176–194.
- Ruepert, A. M., Steg, L., & Keizer, K. (2015). Theoretical basis for organizational pro-environmental research. In J. L. Robertson, & J. Barling (Eds.), *The Psychology of Green Organizations* (pp. 33–57). New York: Oxford University Press.
- Spitzmuller, M., Van Dyne, L., & Ilies, R. (2008). Organizational citizenship behavior: A review and extension of its nomological network. In J. Barling, & C. L. Cooper (Eds.), *The SAGE Handbook of Organizational Behavior Volume 1: Micro Approaches*. UK: Sage.
- Stanke, C., Kerac, M., Prudhomme, C., Medlock, J., & Murray, V. (2013). Health effects of drought: a systematic review of the evidence. *PLOS Currents Disasters*.
- Steg, L., & Vlek, C. (2009). Encouraging pro-environmental behaviour: An integrative review and research agenda. *Journal of Environmental Psychology*, 29(3), 309–317.
- Swim, J. K., Clayton, S., & Howard, G. S. (2011). Human behavioural contributions to climate change: Psychological and contextual drivers. *American Psychologist*, 66, 251–264.
- Tam, V. W. Y., & Tam, C. M. (2008). Waste reduction through incentives: A case study. *Building Research and Information*, 36, 37–43.
- Temminck, E., Mearns, K., & Fruhen, L. (2015). Motivating employees towards sustainable behaviour. *Business Strategy and the Environment*, 24, 402–412.
- Van Dyne, L., & LePine, J. A. (1998). Helping and voice extra-role behaviors: Evidence of construct and predictive validity. *Academy of Management Journal*, 41, 108–119.
- Vining, J., & Ebreo, A. (1990). What makes a recycler? A comparison of recyclers and nonrecyclers. *Environment and Behavior*, 22, 55–73.
- Williams, L. J., & Anderson, S. E. (1991). Job satisfaction and organizational commitment as predictors of organizational citizenship and in-role behaviors. *Journal of Management*, 17, 601–617.
- Wilson, E. O. (1984). *Biophilia*. Cambridge, MA: Harvard University Press.
- Worthington, R. L., & Whittaker, T. A. (2006). Scale development research: A content analysis and recommendations for best practices. *The Counseling Psychologist*, 34, 806–838.
- Zelenski, J. M., Dopko, R. L., & Capaldi, C. A. (2015). Cooperation is in our nature: Nature exposure may promote cooperative and environmentally sustainable behavior. *Journal of Environmental Psychology*, 42, 24–31.
- Zelenski, J. M., & Nisbet, E. K. (2012). Happiness and feeling connected: The distinct role of Nature Relatedness. *Environment and Behavior*, 46, 3–23.

Jennifer L. Robertson is an Assistant Professor in the Department of Management and Organizational Studies and an Adjunct Research Professor in the Department of Psychology at Western University. Jennifer's research focuses on psychological issues involved in organizational environmental sustainability and the nature and prediction of leadership.

Julian Barling is a Professor of Organizational Behaviour and Borden Chair of Leadership at Smith School of Business, Queen's University. Julian's research interests focus on the nature and development of transformational leadership and employee well-being.