An empirical study of 'green' workplace behaviours: ability, motivation and opportunity

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Green human resource management contributes to an understanding of the role of human resource management (HRM) towards sustainability and environmental outcomes. This paper assesses employees' environmental knowledge as well as self-perceptions of ability, motivation and opportunity (AMO) to practise green behaviours by operationalising the AMO framework towards a pro-environmental agenda. The study draws on a survey sample of 394 employees from five organisations in regional Australia. Key findings show that pro-environmental AMO are positively associated with green behaviours and that these are more prevalent at home than in the workplace. Further, line managers moderate the relationship between pro-environmental AMO and green behaviour although not the relationship between environmental knowledge and green behaviour. Such benchmark measurement informs HRM policies, practices and interventions and contributes to environmental management.

Keywords: Green human resource management, Pro-environmental behaviours, Sustainability, Environmental management

> **Key points**
> 1 Promoting a green culture and behaviours that eliminate or reduce harm to the environment have been shown to benefit organisations in a multitude of ways.
> 2 Pro-environmental AMO predicts green behaviours and these behaviours are more prevalent at home than in the workplace.
> 3 Line managers moderate the relationship between pro-environmental AMO and green behaviour although not the relationship between environmental knowledge and green behaviour.
> 4 Benchmark measurement using such an AMO tool can inform future HRM policies, practices and interventions that can contribute to environmental management.

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Environmental issues have increasing prominence, in part, as a response to higher public awareness concerning the role of organisations in causing or preventing ecological problems (Bansal and Roth 2000). This is reflected in the growth in reporting standards such as the Global Reporting Initiative and the trend to align human resource management (HRM) with environmental management via environmentally sustainable policies and practices (Ehnert et al. 2016). Sustainability is embraced generally by governments, business leaders, consumers and communities (Jackson and Renwick 2011). Additionally, organisations are realising the benefits that emerge from engagement in sustainable practices and green behaviour (Buciuniene and Kazlauskaite 2012; Mandip 2012). Industry types in high and low carbon emitting sectors have been classified on their environmental impact as 'high' and 'moderate' (Banerjee, Easwar and Kashyap 2003) with their environmental performance demonstrating the degree to which they are committed to protecting the environment. If firms are seen to be responding to pressing global problems they can be viewed by internal and external stakeholders as good corporate citizens (Orsato 2006).

A key premise of this study is aligned with the view that 'being greener is good for business' (e.g. Crotty and Rodgers 2012). Moreover, employees have a central role in their firm's green practices (Harvey, Williams and Probert 2013; Huffman and Klein 2013) and, to foster long-term environmental sustainability, there is a need to 'recognise and engage in green behaviours' (Dilchert and Ones 2012, 189) such as recycling and waste avoidance. A distinctive feature of HRM is its assumption that improved performance is achieved through people. Practices that build and retain human capital and motivate employee behaviour lead to positive organisational outcomes (Boxall and Purcell 2011). Further, individual perceptions are a key intermediate mechanism linking HR policies to employee attitudes and subsequent behaviour (Chuang and Liao 2010).

Green HRM (GHRM) contributes to an understanding of the role of HRM to include sustainability issues (Kramar 2014), by for example, building a green culture, engaging workers in reducing waste, using resources more efficiently and harming the environment as little as possible (Ehnert et al. 2016; Paillé et al. 2014; Schmit et al. 2012). Thus, the potential to enhance and expand ecologically sustainable practice through HR applications and targeted organisational environmental initiatives is apparent. Literature concerning sustainability has focused largely on the macro- and organisational levels of analysis (Jackson, Ones and Dilchert 2012) resulting in limited knowledge about individual employee's green behaviours (Aguinis and Glavas 2012) as well as those practised and habitualised outside the workplace (Muster and Schrader 2011).

Appelbaum et al. (2000) developed a micro-level framework explaining behaviour through psychological and situational constructs focusing on an individual's ability, motivation and opportunity (AMO). Although quantitative empirical examination of AMO has been neglected AMO is one of the most common conceptualisations of the influence of HRM practices on organisational performance. Hence, our paper operationalises and tests the role of AMO in green behaviours and highlights its utility within a resource based view (RBV) of the firm. Further, we focus on three diverse sectors recognised as influencing improved green attitudes and behaviours, and we contribute to the broader

understanding of the function of line managers in facilitating green outcomes. In sum, the study aims to: operationalise the AMO framework towards a pro-environmental agenda with which to examine green behaviour in the workplace and home; provide much-needed benchmark measurement on which to base future progress towards achieving green behaviours and greater sustainability; investigate whether levels of environmental knowledge and AMO are moderated by the role of line managers; and test whether classification of high or low carbon emitting industry types moderates green behaviours at work.

This study captures empirical evidence of the role of AMO in achieving greater sustainability and provides direction for the further development of a diagnostic tool with which to assess the links between each AMO component: its value rests in identifying relationships between AMO and environmental knowledge in predicting employees green behaviours thus extending the GHRM literature.

First, a review of the theoretical background is provided before describing the specific hypotheses followed by the key features of the study, its sample, data collection, analysis and results. Subsequent sections highlight the main implications for HRM theory and practice, study limitations, future research opportunities and conclusion.

Theoretical background and hypotheses

There are broad literatures on sustainability and Ehnert (2006) explains how the term has been influenced by three different stakeholder groups: ecologists with their concern for environmental protection; business strategy scholars emphasising competitive advantages; and the Brundtland Commission via focus on sustainable development comprising social ecological and economic dimensions. Sustainability is defined here as 'development that meets the needs of the present without compromising the ability of future generations to meet their own needs' (World Commision on Environment and Development 1987, 43). The increasing importance of sustainability is reflected in several organisational practices including strategic HRM. Those capabilities required to contribute to environmental sustainability are identified by Ehnert (2009) as systems thinking, reflection, collaboration, individual self-knowledge and awareness of values. This highlights the need for research concerning the visibility of green attitudes and behaviours often located under the umbrella of sustainable HRM defined as: 'the pattern of planned or emerging HR strategies and practices intended to enable the achievement of financial, social and ecological goals while simultaneously reproducing the HR base over a long term' (Kramar 2014, 1084).

Sustainable HRM is viewed in a variety of ways although essentially the approach tries to balance economic rationality and social responsibility simultaneously (Ehnert 2006). Moreover, the concept refers to activities that improve positive environmental outcomes, GHRM, and 'positive social and human outcomes for their own sake, rather than just as mediating factors between financial outcomes and strategy' (Kramar 2014, 1075). GHRM is defined by Wagner (2013, 444) as: 'Those parts of sustainable HR management dealing with the needs that relate to environmental sustainability. Green HR management is thus

a subset of sustainable HR management where the latter also comprises corporate social responsibility (CSR) issues'.

Our study concerns green attitudes and behaviour that enhance competitive position through the RBV of competing as alignment to green cultures is desirable socially and economically. In particular, the RBV theory explains why some firms in the same industry might differ in performance and looks for internal sources of sustained competitive advantage. Although the RBV offers no prescriptions, it is of indicative value to managers (Kraaijenbrink, Spender and Groen 2010). A firm's resources are sources of sustained competitive advantage if they are valuable, rare, not easy to imitate, and difficult to substitute (Barney 1991) and include:

> all assets, capabilities, organizational processes, firms attributes, information, knowledge, etc. controlled by a firm to enable the firm to conceive of and implement strategies that improve its efficiency and effectiveness (101)

> Resources are valuable when they enable a firm to conceive of or implement strategies that improve efficiency or effectiveness (105)

> A firm is said to have competitive advantage when it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitor (102).

'The guiding logic is that a firm's HRM practices must develop employees' skills, knowledge, and motivation such that employees behave in ways that are instrumental to the implementation of a particular strategy' (Bowen and Ostroff 2004, 203). Critics claim RBV is more of a heuristic than a theory as it does not address fundamental differences in how dissimilar types of resources may contribute to firms' sustained competitive advantage. Our study selects firms that desire to differentiate by developing and obtaining human resources towards achieving greater sustainability. In linking RBV and pro-environmental AMO facilitated via HRM, firms may improve efficiency and effectiveness by reducing costs and eliminating waste. RBV value can also be perceived by customers (Bhattacharya and Sen 2004).

To implement GHRM and environmental management firms must consider work design, production methods, knowledge and understanding of current employees' perceptions and norms associated with environmental sustainability, as well as their involvement and attitudes towards green organisational citizenship behaviour (e.g. Milliman 2013; Paillé, Boiral and Chen 2013). Gaps exist however, as to how, where and in what ways individuals, teams and organisations can contribute most effectively to green organisational outcomes. In particular, there is a dearth of research at the individual level (Aguinis and Glavas 2012; Huffman and Klein 2013). Wagner (2013) claims that such knowledge has potential 'hard' (i.e. cost reducing) or 'soft' (e.g. satisfaction and pride in working for such an organisation) benefits. Indeed, studies have found a positive relationship between HRM and financial performance (Guest 2011). GHRM and environmental management will be advanced through the measurement of 'existing relationships' to assist the development of theoretical frameworks associated with green behaviours (Fernandez, Junquera

and Ordiz 2003, 643). Moreover, how organisations manage their relationships with the ecological environment is of interest to a range of stakeholders as the level of public concern varies between industries (Banerjee, Easwar and Kashyap 2003). For example, the environmental impact of coal power generating companies is more severe than universities given relative outputs of toxic pollution (Australian Bureau of Statistics (ABS) 2010). Yet it is unknown whether employees engage in more or less green behaviours than those working in industries responsible for higher ostensive environmental impact. Green behaviours outside of the work domain are also relevant as employees are consumers (McDonald 2011). As such, employees bring their environmental beliefs, attitudes and values to the workplace and vice versa which can spillover from work to home (Whitmarsh and O'Neill 2010).

AMO theory suggests that employees will perform well when they are able to do so (i.e. they possess the required skills and knowledge); they have the motivation to do so (they want to and/or are rewarded for their behaviour); and their environment provides the opportunity in terms of the facilities and support. AMOs primary focus is at the individual level being used widely as a theoretical basis for examining the HRM–performance relationship (e.g. Bos-Nehles, Van Riemsdijk and Kees Looise 2013). A systematic review (1998–2011) of GHRM and environmental management structured within the AMO framework identified current knowledge gaps on how GHRM may enhance an organisation's human capital. It was concluded that, 'empirical research that identifies the key design variables of effective Green EI [employee involvement] initiatives would be most useful' (Renwick, Redman and Maguire 2013, 10–11).

AMO is a high level generalisation and conceptual model concerning human behavior (Michie, van Stralen and West 2011) although theoretically, each AMO element contributes towards increasing green attitudes and behaviour. For example, green abilities may be explained by self-efficacy resulting from the recruitment and selection of employees with skills that can be used in technical ways to enhance environmental outcomes (e.g. design or implement emission prevention systems); equally this ability may be due to training and development (Daily, Bishop and Massoud 2012). Motivation towards green behaviours could result in environmentally conscious habits and thus protect the environment; and opportunity may be characterised by the availability of facilities and communication systems (or lack of) supporting the recycling of products and green behaviours described as 'pro-environmental'.

GHRM can focus on both work and home domains simultaneously as employees develop ability though frequent practice of behaviours such as conserving energy, recycling, composting and reducing wasteful or polluting practices (McDonald 2011). Direct economic consequences result from sustainable behaviour in the home providing financial motivation which may be consistent with personal values for reducing waste and living sustainably. Further, relative to the workplace, people at home presumably have greater opportunity to adopt and engage in green behaviours. Therefore, we aim to customise the AMO framework towards a pro-environmental agenda to be used both at work and home to test the following hypotheses:

Hypothesis 1a: Pro-environmental AMO is positively related to green employee behaviours at work.

Hypothesis 1b: Pro-environmental AMO is positively related to green employee behaviours in the home.

Hypothesis 1c: Green behaviours are more prevalent in the home than the workplace.

The AMO framework was developed further to include knowledge in appreciation that ability alone does not necessarily precipitate meaningful and motivated behaviour. Green knowledge can lead to understanding and incentivise individuals to behave (or refrain from behaving) in particular ways. It can be learnt from popular media or via specific environmental training and development resulting in greater understanding of environmental impacts. A self-report study of managers in China revealed 'environmental knowledge and values are predictors of personal environmental behaviours' (Fryxell and Lo 2003, 57). Hence, hypothesis 2 should extend the validity of such research by testing in a different cultural context and with a broader sample that includes employees from all hierarchical levels.

Hypothesis 2: Environmental knowledge is positively related to green behaviour.

The role of HR managers is crucial in developing GHRM (Chan, Chan and Okumus 2014; Paillé et al. 2014). In regard to embedding green attitudes and behaviour, workplace culture, values, managerial attitudes and contextual factors can facilitate or constrain behaviour as well as influence motivations (e.g. Florea, Cheung and Herndon 2013; Norton, Zacher and Ashkanasy 2013). Moreover, selected HR practices have been found to impact employees directly but most rely on line manager action or supervisory support (Bos-Nehles et al. 2013; Gollan 2012). CEOs can aid the implementation of HRM as they may commit resources providing legitimacy to HRM policies (Kramar 2014). Middle and line managers influence within-group agreement throughout the organisation and are critical for employee commitment to policies and practices. Line managers and supervisors are particularly well placed to lead by example, communicate mission, operationalise strategic direction as well as support, train and motivate individuals towards particular behaviours. Further, managers have the experience to draw on tacit knowledge to improve processes and often are ideally situated to be 'green champions' (Boiral 2008). Thus, employee attitudes towards green policies and practices are likely shaped by how managers apply these at work leading to the following hypotheses:

Hypothesis 3a: Line managers moderate the relationship between pro-environmental AMO and green behaviours in the workplace.

Hypothesis 3b: Line managers moderate the relationship between environmental knowledge and green behaviours in the workplace.

The next hypothesis tests the industry context for individual differences in employees' green behaviours as industry type and culture, in terms of high and low carbon emitting

organisations has been found to moderate environmental behaviours (Fernandez, Junquera and Ordiz 2003). For example, choice of environmental strategy adopted is influenced by four antecedents: public concern, regulatory forces, competitive advantage, and top management commitment (Banerjee, Easwar and Kashyap 2003).

Hypothesis 4: Industry type moderates the relationship between pro-environmental AMO and green behaviours in the workplace.

Specifically, the research questions to be answered are:

1 Does environmental knowledge and pro-environmental AMO predict green behaviours at work and in the home?
2 Are these behaviours more prevalent in the home than at the workplace?
3 Is AMO moderated by line managers to impact green behaviour at work?
4 Are green behaviours moderated by industry type?

To answer these questions we measure the attitudes and behaviours of employees working in high and low carbon emitting organisations and test the situational and contextual roles of line managers and industry type in moderating green behaviour in the workplace. Attitudes are generally good predictors of corresponding behaviour although situational demands or unexpected events may result in expected outcomes being unrealised. Thus, an individual's attitudes likely correspond to them refraining from green behaviours, or behaving in, green ways. The relationship between the constructs and their associated hypotheses is depicted in Figure 1. In this proposed framework, environmental knowledge and pro-environmental AMO are predictors of employee green behaviours and the relationship may be moderated by line managers and type of industry. The model's practical utility resides in providing a testable pathway for enacting or developing green behaviours. The study also tests for comparable green behaviours outside work, and
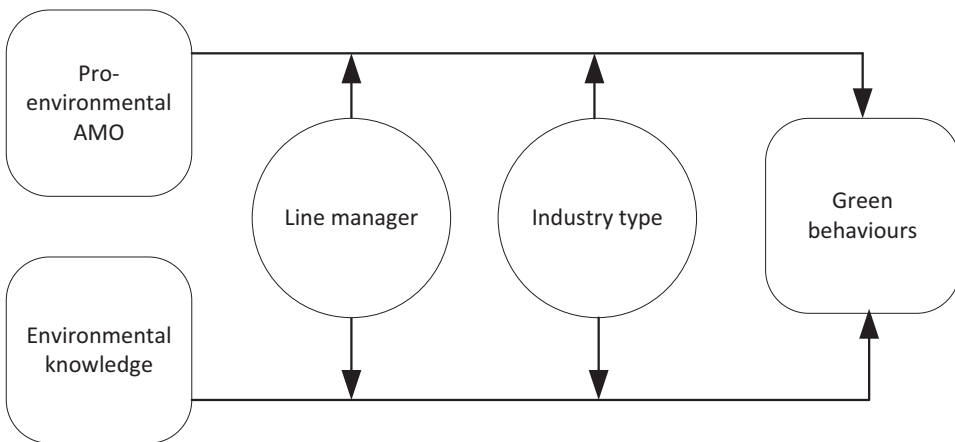

Figure 1 Conceptual model

while this relationship is complex, this knowledge should assist HRM in effective recruitment and training and facilitate positive spillover effects.

In sum, our study aims to provide a much-needed benchmark measurement to progress understanding of green behaviours and enhanced sustainability. It is relevant to organisations concerned with strategy grounded in the RBV where firms compete through differentiation in economic use of resources.

Method

Sample

This cross-sectional research sought a sample-frame of employees from diverse industry sectors producing high as well low carbon emissions. Those selected represent the coal generating power industry, tertiary education and water supply utilities and potentially exert strong but distinct influence on sustainability (ABS 2010). The power sector contributes substantial greenhouse impacts through use of coal for power generation. In 2012, electricity and heat production accounted for 47% of carbon dioxide equivalent emissions in Australia's energy sector (Commonwealth of Australia 2014). Tertiary education, while itself being a relatively small emitter of greenhouse gasses, has a key influence and responsibility for research into sustainability and in educating current and future generations in the importance of sustainability and pro-environmental behaviours. Universities, and business schools in particular, are thought to play a crucial role in educating and developing environmental leaders (Ansari, Gray and Wijen 2011). The water supply utilities, often public enterprises, have a strong incentive to meet environmental goals of clean water supply and water conservation for the public good.

Preliminary study

A preliminary study identified key factors in recognising and developing a workforce characterised by green behaviours. Four power stations were invited to participate in research exploring environmental management strategies, practices, attitudes and green behaviours. One accepted and adopting a case study approach, background data was gathered from the organisation's website, internal news-sheets, site visits, promotional and induction material. Requests were circulated through the company intranet encouraging all employees to participate in this research resulting in 24 semi-structured interviews. The sample was representative of the 500 full-time employee population as it included a broad range of functional areas, experience, seniority and roles across this organisation.

Interview topics were derived from the literature and questions also probed for reactions to initiatives devised to 'green' employees and promote sustainable behaviours. Interviews were approximately 30 minutes in duration, recorded, fully transcribed and conducted on-site in delegated offices allowing privacy. Data were explored and categorised thematically supported by Nvivo 10 software (SPSS 2011). Five themes emerged: drivers for environmental management; organisational culture; attitudes to sustainability,

green policies and practices; barriers to sustainability; green values and behaviours in the workplace and home. Qualitative exploration informed the development of an instrument designed to measure individual green attitudes and behaviours. A pilot-survey tested the instrument with industry executives and university colleagues and resulted in a revised version with enhanced applicability to diverse industrial sectors.

Sampling frame, instrument and procedure

To generate comparable questionnaire results, and allow for moderation of industry type, four additional organisations were invited to participate in the survey. Websites indicated each had interest in, and commitment to, environmental sustainability. The sampling-frame was two coal power generating organisations, two tertiary education institutions and a water utility located in Victoria, Australia with a population of almost six million people (ABS 2015). Each organisation employed over 200 people. As such, they are classified as 'large' organisations (ABS 2014). Discussion with executives signalled a requirement for a short and workplace-relevant questionnaire. The final questionnaire addressed these practical concerns which, although appropriate for this exploratory research project, restricted opportunities for rigorous scale development for theorised constructs. Nevertheless, the instrument provided a test of stated hypotheses with the overarching aim to direct further research. Our anonymous, confidential, self-report questionnaire reduced the likelihood of responses subject to bias from socially desirable answers. Also we were essentially measuring attitude as a behavioural component, although affective and cognitive components may not have a consistent relationship with behaviour (Guagnano, Stern and Dietz 1995; Shove 2010).

The questionnaire contained five sections and 39 questions. Section one elicited employee perceptions for sustainably conscious behaviours (6 items). Respondents reported the frequency of recycling and waste avoidance at work and in the home (4 items), how they compare on these green behaviours to others (2 items), and frequency of purchasing environmentally friendly products (1 item). Section two measured employee level of agreement using seven items and statements concerning their organisation's and their own role in environmental protection. Results are not reported here as this is outside of the paper's scope. In section three respondents self-reported the extent of their knowledge of global environmental issues (6 items with scales anchored by 'know nothing about it' and 'know a lot about it'). Items here were adapted from Bohlen et al. (1993) and Diamantopoulos et al. (2003). Section four measured pro-environmental behaviours by operationalising the AMO framework. As no reported scales were found to guide this development a 6-item scale linked to green workplace initiatives was created. Pilot testing indicated item questions had acceptable face validity. For all items in the four described sections, 6-point scales, underscored by appropriate terms (plus a 'don't know' option), were used to record data. An even number scale has the advantage of not allowing a neutral response, forcing an opinion to be provided and potentially yields more accurate data (Sturgis, Roberts and Smith 2014). The final section collected demographic characteristics and job-related information. These questions provided potential controls as green

behaviours may be associated with the level of education, gender and age (Pirani and Secondi 2010; Whitmarch and O'Neill 2010).[1]

Collaboration with HRM directors/environmental managers facilitated e-mails, complete with web-link, being sent to employees explaining the nature and significance of the research. Two further requests reminded employees of this study. In total, 446 employee responses were received. The sample profile is provided in Table 1.

Data analysis

Initial screening removed surveys <20% complete leaving 394 useable responses. Response rates (following case deletions) were variable. For power generation ($n = 158$) and water utility sector ($n = 43$) these were 23% and 21%, respectively, and tertiary education ($n = 193$) was 3%. This latter result reflected a large scale where one university has over 5000 full-time equivalent employees. The response rate yielded in this sector may appear low which is not uncommon for online surveys. Moreover, low uptake in this sector may be credited to the frequency of survey requests being made in a country that is experiencing survey fatigue.

Data were analysed in four steps for preliminary analyses to test hypotheses (see Appendix). Step 1 tested for statistical differences for key descriptive person variables to assess the homogeneity of the sample. These were employee age, gender, supervisory role and education level. Employed tests were chosen based on the data nature and distribution using an alpha level $p < 0.05$ with statistically significant results reported. Step 2 grouped three green work-related items (Cronbach's $\alpha = 0.67$) and three green

Table 1 Person and work-related variables by industry sector

		Power generation sector	Tertiary education sector	Water utility sector	Test statistic
Age (years)					
N		149	192	42	$F_{2,380} = 4.04$,
Mean		47.2	45.4	41.5	$p = .02$
SD		10.1	12.1	13.4	
Gender					
Male	f	137	41	28	$\chi^2(2) = 161.22$,
Female	f	17	152	14	$p < .001$
Supervisor					
Yes	f	56	52	18	ns
No	f	98	141	24	
Education level					
School level	f	21	11	4	$\chi^2(4) = 44.05$,
Trade level	f	73	38	13	$p < .001$
University level	f	60	142	25	

$N = 394$. ns = not significant at $p < 0.05$; SD = standard deviation; f = frequency.

home-related items (Cronbach's $\alpha = 0.54$) from section one (sustainably conscious behaviours) of the questionnaire into two average scores. One-way ANOVAs tested for differences among industry sectors on these two variables. To test hypothesis 1, two items each representing a pro-environmental AMO element were grouped into average scores producing three variables representing ability (Cronbach's $\alpha = 0.65$), motivation (Cronbach's $\alpha = 0.74$) and opportunity (Cronbach's $\alpha = 0.42$) to engage in workplace initiatives. Pearson product-moment correlation tested for statistically significant relationships between pro-environment AMO elements and green behaviours both at work and home. These tests were conducted for each industry sector and for the combined sample. Hypothesis 2 was tested in step 3 by grouping the six knowledge items (knowledge of global environmental issues) into one variable representing response average scores (Cronbach's $\alpha = 0.91$). Pearson product-moment correlation tested for relationships between this variable and green behaviours at both work and home for each industry sector and overall. Above-reported reliability tests are for information only. Subsequent analysis does not assume homogeneous or singlefactorial constructs (Briggs and Cheek 1986). Scale development for constructs measured in this study is an important area for future research.

Hypothesis 3 was tested in step 4 by ordinary least squares regression. Predictor variables were the three pro-environmental AMO element average scores, knowledge average score, line manager role and industry type (dummy coded). Interaction variables testing for moderation were produced from centred data following the procedure described by Howell (2002, 578–580). Four cases were removed from the model due to being outliers based on analysis of standardised residuals, Cook's distance, Mahalanbolis distance and the covariance ratio (Field 2013). The criterion variable was the composite for sustainably conscious behaviours at work using the average for three items. Model results are limited to the sample.

Results

Table 1 reports descriptive results for demographic variables. Water utility employees were on average younger relative to employees in the other two sectors (based on multiple comparisons using the Bonferroni method). For gender, males were overrepresented in the power and water utility sector and underrepresented in the tertiary education sector reflecting, to an extent, proportional population differences. As expected, each sector had fewer employees with line management roles relative to other employees, and tertiary education employees were overrepresented by those possessing university level qualifications.

On average, Table 2 shows that employees across the three sectors self-reported the frequency of green behaviours well above the scale mid-point (3.5). Frequencies were higher for home-based behaviours relative to those practised at work. Multiple comparisons (Bonferroni) revealed that at work, employees in the power generating sector had a relatively lower frequency of engagement in green work behaviours relative to tertiary sector employees.

Table 2 Frequency of green behaviours at work and home by industry type

	Power generating sector	Tertiary education sector	Water utility sector	Test statistic
Green work behaviours				
N	158	193	43	$F_{2,391} = 9.04$,
Mean	4.5	4.9	4.9	$p < .001$
SD	1.0	.8	.8	
Green home behaviours				
N	158	193	43	ns
Mean	5.1	5.2	5.1	
SD	.8	.6	.8	

$N = 394$. ns = not significant; SD = standard deviation

A statistically significant relationship was found overall for relationships between pro-environmental AMO elements and the frequency of green behaviours at work and in the home (Table 3). The results provide support for both hypotheses 1a and 1b as

Table 3 Relationships between pro-environmental AMO elements plus environmental knowledge and green behaviours at work and home ($N = 394$)

	Green work behaviours	Green home behaviours
Ability		
Power generating sector	.57**	.28**
Tertiary education sector	.47**	.26**
Water utility sector	.61**	.30
Overall	.56**	.29**
Motivation		
Power generating sector	.52**	.28**
Education sector	.48**	.36**
Water utility sector	.24	.09
Overall	.50**	.31**
Opportunity		
Power generating sector	.42**	.22**
Tertiary education sector	.38**	.19**
Water utility sector	.51**	.37*
Overall	.42**	.23**
Environmental knowledge		
Power generating sector	.16*	.08
Tertiary education sector	.34**	.30**
Water utility sector	.45**	.49**
Overall	.28**	.23**

$N = 394$. *$p < 0.05$, **$p < 0.01$.

pro-environmental AMO is positively related to green behaviours at work and at home, although the relationships were not consistent across sectors. Water utilities had lower and non-significant results for the relationship between ability (in regard to responding to workplace initiatives) and home green behaviours plus that between motivation and both work and home green behaviours. Hypothesis 1c: Green behaviours are more prevalent in the home than the workplace was also supported overall ($t[786] = -6.9$, $p < 0.001$) and for the power generating ($t[314] = -5.5$, $p < 0.001$) and tertiary education sectors ($t[384] = -4.3$, $p < 0.001$). Table 3 overall results also lend support for hypothesis 2: High levels of environmental knowledge is positively related to green behaviour. Industry sector differences were again found where environmental knowledge was not related to green behaviours in the home for the coal power generating sector.

OLS regression produced a significant model predicting the frequency of green behaviours at work (Adjusted $R^2 = 0.45$: $F_{8,381} = 40.56$, $p < 0.001$). The initial modelling included age, gender and education as controls in addition to variables listed in the data analysis section. Ability, motivation, and environmental knowledge were significant predictors. Opportunity, industry type and supervisory role did not add significantly to the model variance. For the investigated interactions, three were significant (Table 4). This indicates that a line manager role moderates both ability and motivation providing support for hypothesis 3a whereas hypothesis 3b: Line managers moderate the relationship between environmental knowledge and green behaviour, was not supported.

Opportunity was expected to be a significant predictor of environmental work behaviours given statistically significant correlations reported in Table 3. This relationship was explored although not found (Table 4). To identify a possible role of opportunity within the AMO framework, interaction terms for the relationship of this construct with ability and motivation were included in the model. Motivation was moderated significantly by opportunity in the model.

Table 4 Standard multiple regression modelling predictors of green work behaviours

	B	SE B	B	T	Partial correlation
Constant	4.871	.38			
Ability	.29	.05	.32	5.50***	.27
Motivation	.20	.06	.20	3.69***	.19
Opportunity	.04	.04	.05	.98	.05
Environmental knowledge	.17	.04	.18	4.72***	.24
Supervisor role	−.05	.07	−.03	−.72	−.4
Ability × Supervisor role	.39	.11	.19	3.74***	.19
Motivation × Supervisor role	−.33	.12	−.14	−2.71**	−.14
Motivation × Opportunity	−.19	.03	−.22	−5.52***	−.27

$N = 384$. ** $p < 0.01$; *** $p < 0.001$. $R^2 = 0.46$ (OLS regression enter method). Criterion variable green work behaviours. Predictor variables centred using mean scores.

Discussion and implications

The study provides empirical evidence substantiating the theoretical role of the AMO in linking employees with green behaviours. For example, employees from each sector indicated that they often (on average) recycled and avoided waste at work and at home (hypothesis 1a and hypothesis 1b). Additionally, hypothesis 1c, underpinned by theory that green behaviours may reduce living expenses, implying employees would be more strongly motivated towards green behaviours at home, was also supported. Green behaviours may be enhanced at home due to control or 'opportunity' to implement sustainable practices such as recycling or reducing waste. Qualitative data reinforced this view as respondents provided examples of minimising the use of water, electricity and other materials (e.g. switching off lights, heating and/or relying on solar power, composting, recycling).

A strong generic base of environmental knowledge was found to exist across all surveyed industries and is positively related to green behavior (hypothesis 2). The role of knowledge is important given that controlling environmental impact is viewed as a responsibility for all employees (Florea, Cheung and Herndon 2013). Moreover, tacit knowledge is influential in identifying sources of pollution and developing preventative solutions.

Despite clear dissimilarities in the sample's demographic profiles (Table 1), no differences on knowledge were found between the education and power sectors except where the former self-rated relative higher knowledge of unsustainable consumption. Individual and group differences between employees in each sector are identified in terms of perceptions of their environmental knowledge and self-reported behaviours. Arguably, the finding that environmental knowledge predicts green behaviour contributes to a RBV in terms of a firm's competitiveness and sustainability. The qualitative data from the power sector employees supported this:

> I'm working at a brown coal power station, but for me anyway it's one where I know we're making efforts. We know we're not clean, we're cleaner than some others.   (Employee)

> I think it's a balance… it's management giving people the challenge and opportunity to say, we need to do this… hiring the right people, as we actually aim to hire the people who are driven to excellence themselves. So they want to be challenged, and they want to do – they go above and beyond.   (Manager)

If a firm's managers' leverage the future value of a resource better than its competitors, then a source of sustained competitive advantage should be achieved. Further, culture, values, managerial attitudes and contextual factors can facilitate or constrain behaviour as well as influence motivations (e.g. Bissing-Olson et al. 2012; Steg and Vlek 2009). Barriers and challenges to green and sustainable behaviours, despite organisation and employee goodwill, will arise through prohibitive costs resulting from resource scarcity. For example, in several Australian states including Victoria, the power generating industry is in private ownership (Australian Energy Regulator 2015). These profit-driven businesses operate in a highly regulated and increasing competitive businesses environment

demonstrated by growth in renewable energy generation. Where organisations have limited opportunities for innovative and sustainable solutions, due to timeframes or costs, they may focus primarily on cost reduction to maintain profit margins for electricity distribution.

The finding that line managers' moderate pro-environmental AMO and green behaviours of employees (hypothesis 3a) is consistent with management literature. In particular, perceptions of GHRM practices are likely to be shaped by how their managers and supervisors apply these practices and influence the work environment. Hypothesis 3b was not supported as it was found that line managers do not moderate the relationship between environmental knowledge and green behaviours. This result may be related to the extent of environmental knowledge held by this sample. Alternatively, it may be explained by the individual values held by line managers or the complexities, competing demands and paradoxes associated with the role.

It was somewhat surprising that 'industry type' did not moderate green behaviours (hypothesis 4) as previous studies had found this effect (e.g. Banerjee et al. 2003; Fernandez, Junquera and Ordiz 2003). One explanation for a lack of detected effect may be that employees in high carbon emitting industries experience relatively greater pressure from their organisational leaders, regulatory bodies and the general public. Such industries may have more emphasis on training and development concerning sustainability. Although outside of the scope of this study, the role of leadership and other contextual factors must be considered and even highlighted (Robertson and Barling 2013). Alternatively, the finding may capture normative values regarding a belief in the 'right thing to do'. This was evident in the preliminary study: 'and not being liked so much by some groups, you like to try and at least demonstrate on the outside that I'm as committed to green as anyone else. We recycle, we plant trees, we have solar panels. . .'

The level of agreement across pro-environmental AMO item scores was generally consistent which accords with our organisations' stated website claims of engaging in environmentally sustainable activities. In particular, green behaviours were relatively more frequent for employees in tertiary education and, to a greater extent, green behaviour was reported as being undertaken more frequently, when compared to others. This corresponds with relatively strong agreement on their sector's role in environmental protection (Davis 2008; Jabbour 2010). The finding may also be explained by an educator's responsibility towards scholarly leadership in sustainability (see Renwick, Redman and Maguire 2013). Additionally, both universities were signed up to a framework for systemic change in business schools and other management related institutions (i.e. Principles for Responsible Management Education). Even so, the similarities in this study between employee groups drawn from three distinctive sectors, with particular regard to the relative size of their carbon footprints, demonstrates a common and consistent level of environmental consciousness within each workplace.

Using an AMO grounded diagnostic tool such as this generates knowledge to inform scholars and practitioners concerned with sustainable HRM and GHRM where strengths and weaknesses may lie. Although beyond the scope of this study, the findings could have

implications for better organisational performance (see Buller and McEvoy 2012). For firms satisfied with their competitive position, the RBV does not bring much insight, for the theory's relevance follows directly from managers' aspirations and intentions (Kraaijenbrink, Spender and Groen 2010). Thus, the AMO framework can help analyse barriers and direct those responsible for HRM in their future decisions to target green training and development within the workforce. 'A key to the effectiveness of training is developing an environmental knowledge base' (Renwick, Redman and Maguire 2013, 4), granting that greater empirical evidence of the impact of such initiatives is needed. We propose that measurement and evaluation of pro-environmental knowledge and AMO serves this purpose. Moreover, future research should identify and support the implementation of GHRM training and development interventions. This empirical level of analysis not only generates useful insight, it also has practical implications.

Limitations and directions for research

While samples were considered to be representative of employees in each organisation, respondents were self-selected for participation indicating the potential for unknown bias. Results may be generalisable to other industry sectors in Australia and elsewhere but this presumption requires further testing. Responses may have been subject to social desirability and other common method biases associated with cross-sectional self-reported data although the confidential and anonymous data collection reduced the potential (Donaldson and Grant-Vallone 2002; Podsakoff et al. 2003). Reported statistical associations for constructs developed temporally, based on data collected at one time-point, may also have been subject to method variance. The results, including those from reported statistical models, should be interpreted in this light. Practical constraints limited opportunities for rigorous scale and construct development, but, important for further research, items had face-validity and were assessed for construct validity for a multi-sector organisational sample (Flick 2015). Future research may establish criterion validity through assessment of employee perceptions against organisational sector performance on established sustainability measures (e.g. standardised greenhouse emissions).

A further limitation is the study design is unable to identify cause and effect relationships. In addition, should employees be selected, a priori, on their perceived role regarding environmental protection? Such insights will assist organisations and HRM practitioners to assess current and planned green initiatives and appraise suitable channels and methods for implementation. We propose that a diagnosis of the state of current attitudes and actions towards green behaviour will improve our understanding of the antecedents and mediators that contribute to greater sustainability.

The AMO instrument was a parsimonious composite measure of three elements providing an exploration of reputed variables associated with green behaviours. As noted above, items were considered to have adequate face validity. The support found for hypothesised relationships between items support the instrument's construct validity. Nevertheless, a more detailed instrument should identify individual strengths and weaknesses in each green domain of ability, motivation and opportunity. As such, more items

need to be developed and tested to further capture each element of AMO and allow more thorough exploration (e.g. mediation). The instrument may also be used as a pre- and post-evaluation of GHRM initiatives to provide insight to potential pathways for implementing HRM interventions. For example, to reinforce employee green ability and self-efficacy, training could focus on skill development; to raise motivation towards green behaviours, appraisal systems may need to reflect positive feedback, praise or more tangible rewards for green behaviours.

Future research may employ methods reported here to assess employee environmental consciousness across broad geographical, industrial and occupational ranges and over time. Also, qualitative research in broader industries has an important role complementing positivistic approaches. To better understand GHRM adoption in the workplace, investigation is required to determine how consistent green attitudes and behaviour may be facilitated by recruitment and selection practices, training and development, performance management and appraisal, reward and recognition, and in engendering support from trade unions. As employee organisational perceptions reflect corporate culture and this is linked to performance, a further avenue advocated is investigating GHRM strategies designed to influence corporate culture. Particular focus of interest should be concerned with providing employees with opportunities to engage in environmental management initiatives and removing perceived or actual barriers.

Conclusion

The aim of this mixed method study was to contribute to the GHRM literature by operationalising the AMO framework towards a green agenda to assess employees' environmental knowledge, ability, motivation and opportunity to practise green behaviours using a self-report survey. RBV has been applied to a wide range of phenomena and in our study we argued for its relevance to pro-environmental AMO. A benchmark measurement on which to base future progress towards achieving green behaviours and sustainability has been provided. Results indicate that GHRM efforts should support staff to develop environmental knowledge, ability and motivation as well as provide opportunities to facilitate greater sustainability. The pro-environmental AMO tool contributes to organisational learning in the green domain suggesting it can contribute to competitive advantage by identifying where abilities, opportunities or motivations are enhanced towards greener attitudes and behaviours. Hence, GHRM practices and quality environmental management systems that facilitate learning become valuable to firms and the use of an AMO diagnostic tool would support this potential. Although further research is necessary, the instrument offers pre-and post-measurement to direct green training and development initiatives. The study method may also inform on specific GHRM interventions most appropriate and effective in engaging employees' actions that accomplish greater sustainability within the workplace. Subsequent change may spillover into sustainable behaviours practised at home which, we argue, should be encouraged through HRM.

Acknowledgements

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Note

[1] A copy of the questionnaire is available on request.

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Appendix 1 Item grouping for composite variables

Composite variable	No.	Survey item
Green work behaviours	1	At work, I avoid wasting resources such as electricity or water
	2	At work, I recycle (e.g. paper, cans, batteries, oil)
	3	Compared to others at my work, I minimise and recycle waste
Green home behaviours	4	At home, I recycle paper and cardboards
	5	At home, I avoid wasting resources such as electricity or water
	6	Compared to others at my home, I minimise and recycle waste
Ability	7	I have the ability to apply the initiatives in my workplace (i.e. I know what to reuse/recycle)
	8	Environmentally friendly initiatives do bring real benefits to my workplace
Motivation	9	I actually do apply environmentally friendly initiatives in my workplace
	10	I do not want to apply environmentally friendly initiatives in my workplace (reverse coded)
Opportunity	11	I have opportunities to apply initiatives at work (e.g. switching off power or recycling collection)
	12	Nothing stops me applying the environmentally friendly initiatives to my workplace
		How much do you know about the following issues?
Environmental knowledge	13	Climate change
	14	Clean energy
	15	Landfill waste
	16	Drinking water purity
	17	Unsustainable consumption
	18	Land degradation

Appendix 2 Survey item correlation matrix

No.[a]	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	1																	
2	.399**	1																
3	.434**	.320**	1															
4	.270**	.353**	.345**	1														
5	.422**	.212**	.297**	.377**	1													
6	.130*	.169**	.347**	.237**	.251**	1												
7	.412**	.490**	.261**	.242**	.240**	.132*	1											
8	.422**	.328**	.378**	.199**	.279**	.157**	.465**	1										
9	.519**	.527**	.308**	.260**	.307**	.177**	.704**	.592**	1									
10	.207**	.225**	.166**	.155**	.185**	.083	.322**	.219**	.272**	1								
11	.387**	.502**	.179**	.171**	.184**	.164**	.674**	.492**	.746**	.171**	1							
12	.291**	.326**	.089	.136**	.152**	.120*	.421**	.367**	.501**	.114*	.596**	1						
13	.251**	.184**	.194**	.135**	.103*	.113*	.167**	.141**	.199**	.097	.151**	.074	1					
14	.212**	.167**	.141**	.169**	.126*	.079	.170**	.119*	.195**	.103*	.167**	.098	.779**	1				
15	.191**	.177**	.191**	.185**	.181**	.177**	.168**	.150**	.149**	.106*	.145**	.048	.575**	.570**	1			
16	.285**	.160**	.161**	.127*	.221**	.110*	.236**	.182**	.176**	.083	.177**	.141**	.553**	.602**	.608**	1		
17	.221**	.150**	.198**	.134**	.159**	.126*	.183**	.121*	.178**	.098	.138**	.028	.587**	.598**	.622**	.615**	1	
18	.237**	.162**	.157**	.098	.190**	.112*	.193**	.180**	.205**	.093	.172**	.094	.624**	.623**	.675**	.629**	.703**	1

*Correlation is significant at the 0.05 level (two-tailed); **Correlation is significant at the 0.01 level (two-tailed).
[a]Item labels for numbers 1–18 are listed in Appendix 1.