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# Turn It Off: Encouraging Environmentally-Friendly Behaviours in the Workplace

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## Abstract

This paper reports the results of a pre-test post-test intervention study that aimed to encourage energy conservation behaviour by office workers at a large Australian hospital. Using visual prompts and top management support for energy conservation behaviour, significant long-term improvements were made for behaviours with individual responsibility. However, for behaviours with collective responsibility the results were mixed. Energy audits were used as an objective measure of behaviour change. Additionally, pre- and post-intervention surveys revealed significant changes in self-reported behaviour, perceived top management support, perceived internal environmental orientation, norms, and knowledge regarding energy conservation behaviour. The findings suggest that different intervention strategies may be required depending on whether the targeted behaviours have collective or individual responsibility.

**Keywords:** organisational culture/values, sustainability, triple bottom line, social auditing and reporting, corporate social responsibility

## 1. Introduction

In the context of climate change, carbon tax, and limited resources, reducing electricity use is particularly important for businesses (De Young, 1993; Stern, 2000). In the 2001–02 financial year 127,095 gigawatt hours of electricity were supplied to commercial customers in Australia, accounting for two-thirds of the total electricity produced in Australia for that year (Australian Bureau of Statistics, 2004). These figures highlight an opportunity for businesses to reduce costs by reducing electricity use and associated carbon emissions. One way to achieve reductions in energy use is to encourage employees to engage in energy conservation behaviour (De Young, 1993; Mobley, Vagias, & DeWard, 2010). This paper reports the results of an intervention conducted at a large Australian hospital with the goal of encouraging energy conservation behaviour through the use of prompts and top management commitment.

Energy conservation is one type of workplace pro-environmental behaviour, which is defined as “any action taken by employees that she or he thought would improve the environmental performance of the company” (Ramus & Steger, 2000, p. 606). The main issue with workplace pro-environmental behaviour is how to effectively encourage employees to engage in such behaviour, and make it part of their everyday routine. Prompts are one way to encourage behaviour, and can be defined as “a visual or auditory aid which reminds us to carry out an activity that we might otherwise forget” (McKenzie-Mohr & Smith, 1999, p. 61). In other words, prompts are an effective way of reminding individuals about new tasks until they become established as routines. Even after a task has become routine, prompts can continue to be useful by helping to maintain these routines.

Prompts are one of the most simple and least expensive behaviour change interventions (Schultz, Oskamp, & Mainieri, 1995), and they have been applied to various contexts and behaviours including pro-environmental behaviour (Lehman & Geller, 2004). In addition to being inexpensive and simple, prompts are also less intrusive compared to other strategies such as social pressure and material disincentives (De Young, 1993; Schultz et al., 1995). Further, they can produce immediate changes in behaviour, and can potentially influence large numbers of people (De Young, 1993). There are many studies, reviews, and meta-analyses that conclude that prompts are an effective tool for increasing pro-environmental behaviour (Lehman & Geller, 2004; Osbaldiston, 2004; Osbaldiston & Schott, 2011; Schultz et al., 1995).

Osbaldiston's (2004) meta-analysis showed that prompts have been used successfully to increase recycling, water conservation, and energy conservation. In particular, using prompts was the second most effective method for increasing energy conservation behaviour, second only to the more expensive strategy of providing incentives (Osbaldiston, 2004). A more recent meta-analysis by Osbaldiston and Schott (2011) supported their earlier findings, and concluded that prompts are one of the most effective ways to increase pro-environmental behaviour. Lehman and Geller (2004) provided a summary of studies on prompts and concluded that prompts are particularly effective when targeting littering, energy use, and recycling. The studies cited by Lehman and Geller (2004) were conducted in various contexts, including movie theatres, grocery stores, shopping centres, football stadiums, camping areas, prisons, research centres, universities, neighbourhoods, and households. Despite the broad range of research settings, Lehman and Geller (2004) noted a lack of research in institutional, corporate, and industrial settings.

Research by Sussman and Gifford (2012) is one of very few studies on prompts within a corporate setting. Their study used prompts to encourage people to turn off the lights in unoccupied bathrooms at a university campus. The prompts consisted of signs with the following message: "Washroom empty? Conserve energy – Please turn off the lights. Turning off the lights for even 5 seconds saves electricity, which reduces greenhouse gas emissions... and that's a good thing, thanks!" (Sussman & Gifford, 2012, p. 598). The study utilised an ABAB-B design. The first phase of the study involved establishing baseline levels for one week (A1), before implementing the prompts and leaving them in place for two weeks (B1). The prompts were then removed for one week (A2), and subsequently reinstated for approximately 12 weeks. During the 12 week period, data collection occurred during the first (B2) and last (B3) weeks. Compared to bathrooms without prompts, bathrooms with prompts were eight times more likely to have lights turned off (Sussman & Gifford, 2012). Although Sussman and Gifford's (2012) study utilised an objective measure of behaviour, most studies typically rely on self-reported data, and this is a disadvantage. Self-reported data is vulnerable to inaccuracies, especially social desirability bias (Fisher, 1993).

In addition to using prompts, there are other factors that highly influence employee engagement in workplace pro-environmental behaviour including top management commitment and internal environmental orientation (Banerjee, Iyer, & Kashnap, 2003). Top management commitment is the extent to which top management is perceived to be supportive of workplace pro-environmental behaviour (Banerjee et al., 2003). Research has shown that top management commitment has a positive effect on corporate environmentalism, workplace pro-environmental behaviour, and supervisor support for employees engaging in workplace pro-environmental behaviour (Andersson, Shivarajan, & Blau, 2005; Banerjee et al., 2003; Ramus & Steger, 2000). If top management model and/or demonstrate the desired workplace pro-environmental behaviour, further positive influence can be achieved (Feasby & Wells, 2011; Kane, 2011). An advantage of having strong top management commitment to workplace pro-environmental behaviour is that it flows through to the culture of the organisation, that is, its internal environmental orientation (Banerjee et al., 2003). Internal environmental orientation is the degree to which environmental issues are considered in the goals, values, and day-to-day operation of the company (Banerjee et al., 2003). Russell and McIntosh (2011) argued that if an organisation wants to become sustainable, changes in culture are required.

Social psychological theory suggests that attitudes, subjective norms, and descriptive norms are also important influences on behaviour (Ajzen, 1991; Kraus, 1995; Rivas & Sheeran, 2003). An attitude reflects a person's positive or negative evaluation of an attitude object (Ajzen, 1991). In the context of energy conservation this refers to how favourable people feel about engaging in energy conservation behaviours, and it is proposed that more positive attitudes to energy conservation should be associated with greater

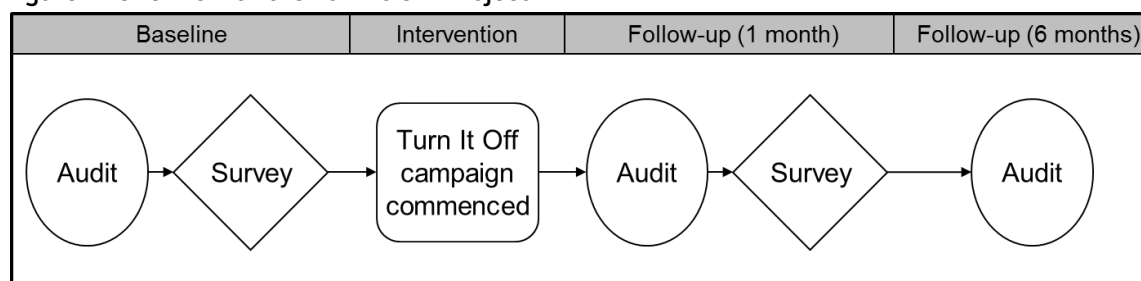
engagement in these actions (Ajzen, 1991). Similarly, subjective norms – perceived social pressure to engage in certain behaviours – can also result in greater intentions to perform those behaviours (Ajzen, 1991; Ravis & Sheeran, 2003). Ravis and Sheeran (2003) conducted a meta-analysis and found that descriptive norms are also predictive of behavioural intentions. Descriptive norms refer to perceptions of what other people typically do (Cialdini, 2003). Finally, knowledge about energy conservation behaviour is also important (Abrahamse, Steg, Vlek, & Rothengatter, 2005), because in order to perform energy conservation behaviours one must first know how to do so.

It is clear that prompts are effective at increasing energy conservation behaviour; however it is not yet known what effect they have in the workplace. It is also clear that top management support plays an important role in workplace settings, and therefore could assist the implementation and effectiveness of prompts in the workplace. With this in mind, the research questions of the current study are: What effect do prompts have on energy conservation behaviours in the workplace? What is the impact of top management support? The current study aims to encourage energy conservation behaviours by office workers at a large Australian hospital. Prompts and top management commitment will be utilised to achieve this goal. The study will also examine whether the interventions result in any changes in psycho-social variables including internal environmental orientation attitudes, descriptive norms, subjective norms, and knowledge about energy conservation behaviour. Notably, the current study addresses two gaps in the literature: (1) the use of self-reported measures as an indicator of behaviour; and (2) the lack of research on prompts conducted in workplace settings.

## 2. Method

The current study consisted of three main components: the intervention (Turn It Off campaign), energy audits, and surveys. Figure 1 depicts the overall timeline of the project, and the pre-test post-test design.

**Figure 1: Overview of the Turn It Off Project**



### 2.1 Intervention

The purpose of the intervention was to encourage energy conservation behaviour in the workplace through the use of prompts and top management commitment. The energy saving behaviours that were targeted by the intervention included turning off lights in unoccupied offices, unplugging chargers when not in use, turning off computer hard drives and monitors each night, and turning off air-conditioners when not in use. The intervention consisted of three components: (1) posters emphasising top management commitment to energy conservation; (2) stickers placed near switches prompting staff to “Turn It Off”; and (3) communications from various sources within the organisation, including top management (e.g., an email from the CEO to introduce the campaign to staff, and an email from the Information Technology Department to encourage staff to turn off computers overnight). Thus, the campaign clearly emphasised top management commitment to energy conservation behaviour. A total of 250 posters were displayed in prominent areas (e.g., notice boards) throughout the buildings, and 5,000 stickers were placed immediately next to light switches.

## 2.2 Energy Audits

The purpose of the energy audits was to obtain an objective measure of the number of appliances left on outside normal office hours. The audits involved a small team of researchers visually inspecting 246 offices located in three different buildings. Some offices were shared/open plan and others were individual. The audits focused on appliances that were targeted in the Turn It Off campaign (lights, computer monitors and hard-drives, chargers, and air-conditioners). For each office the total number of appliances was counted as well as the number of appliances left on, so that the proportion of appliances left on could be calculated (the proportion takes into account any changes in the number of each appliance across the six months). The first audit was conducted on 8, 9, and 10 March 2011 (prior to the intervention), the second audit was conducted on 11 and 12 April 2011 (one month after the intervention), and the third audit was conducted on 12, 13, and 14 September 2011 (six months after the intervention). All three audits were conducted during the evening (outside normal office hours).

## 2.3 Survey

The survey was conducted online and contained measures of self-reported energy use (4-item scale, e.g., "please indicate how often in the last week you do the following while at work...turn off lights in unoccupied rooms"), perceived top management commitment (3-item scale, e.g., "our organisation's energy saving efforts receive full support from our top management"), perceived internal environmental orientation (4-item scale, e.g., "energy conservation is a high priority activity in our organisation"), attitudes towards workplace energy conservation (3-item scale, e.g., "I think engaging in energy saving behaviours is...good/bad"), as well as one item each measuring descriptive norms (e.g., "most staff save energy in the workplace"), subjective norms (e.g., "it is expected of me that I save energy in my workplace"), and knowledge about energy conservation in the workplace (e.g., "I know how to save energy in the workplace"). All items were answered on 5-point Likert scales. The scale labels for items ranged from 1, *strongly disagree* to 5, *strongly agree*, with the exception of the self-reported energy use items (1, *rarely or never* to 5, *always or almost always*), and the three attitude items (I think engaging in energy saving behaviour is...1, *good* to 5, *bad*, 1, *important* to 5, *unimportant*, and 1, *valuable* to 5, *worthless*). The survey was administered twice throughout the project; baseline measurement occurred from 14 to 26 March 2011 (prior to the intervention), and follow-up measurement occurred from 13 to 23 April 2011 (one month after the intervention).

## 3. Results

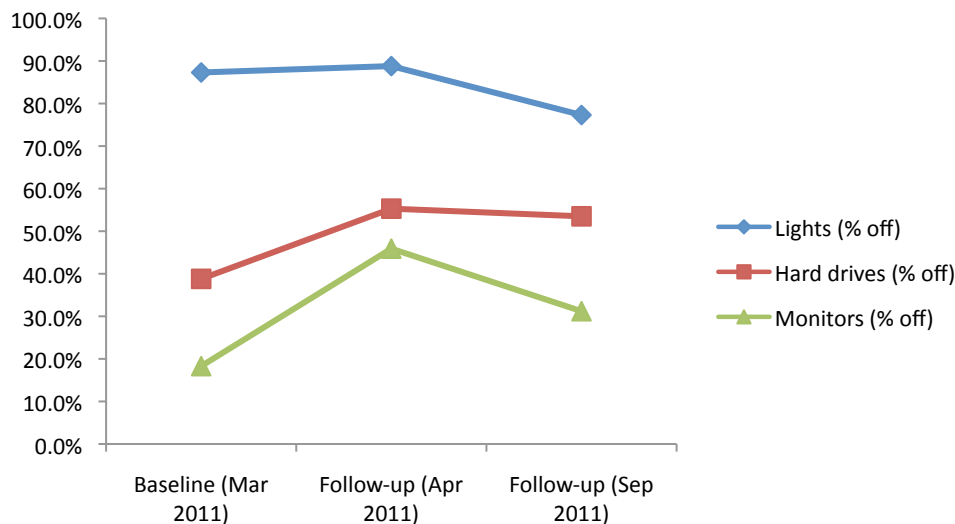
### 3.1 Participant Demographics and Response Rate

The baseline and follow-up surveys were sent to 816 non-clinical staff at a large Australian hospital. A total of 312 staff responded to the baseline survey, and 278 staff responded to the follow-up survey. There were 115 matching responses (14% response rate) across the two surveys. All analyses reported in relation to the survey and demographics refer to the 115 matching participants. The average age of participants was 40.5 years, and ranged from 17 to 70 years. Approximately two-thirds of participants were female, and one-third were male. Most were employed full-time (87%), some part-time (12%), and very few casuals or other employment types (1%). The average tenure at the organisation was six years.

### 3.2 Energy Audits

Energy audits were conducted to provide an objective measure of behaviour before the intervention, one month after the intervention and six months after the intervention. Figure 2 depicts the key findings from the energy audits.

**Figure 2: Findings from the Energy Audits**



#### *Lights*

At the time of the first audit, 970 out of 1,111 lights were turned off (87.3%). At the time of the second audit, 914 out of 1,029 lights were turned off (88.8%), representing a slight increase (1.5%) in the proportion of lights turned off. However, this difference was not significant,  $X^2 = 1.16$ , *ns*. At the time of the third audit, 823 out of 1,064 lights were turned off (77.3%), representing a decrease in the proportion of lights turned off compared to both the first and second audits (10% and 11.5%, respectively). Both differences were significant,  $X^2 = 37.23$ ,  $p < .05$  (first vs. third), and  $X^2 = 48.79$ ,  $p < .05$  (second vs. third).

#### *Hard drives*

At the time of the first audit, 177 out of 464 computer hard drives were turned off (38.8%). At the time of the second audit, 240 out of 434 computer hard drives were turned off (55.3%), representing a 16.5% increase in the proportion of computer hard drives turned off. This difference was significant,  $X^2 = 26.53$ ,  $p < .05$ . At the time of the third audit, 198 out of 368 computer hard drives were turned off (53.8%), representing a 15% increase in the proportion of computer hard drives turned off compared to the first audit. This difference was also significant,  $X^2 = 19.63$ ,  $p < .05$ . The difference between the second and third audits was not significant,  $X^2 = .25$ , *ns*.

#### *Monitors*

At the time of the first audit, 122 out of 668 monitors were turned off (18.3%). At the time of the second audit, 266 out of 579 monitors were turned off (45.9%), representing a 27.6% increase in the proportion of monitors turned off. This difference was significant,  $X^2 = 110.86$ ,  $p < .05$ . At the time of the third audit, 137 out of 439 monitors were turned off (31.2%), representing a 12.9% increase in the proportion of monitors turned off compared to the first audit. This difference was significant,  $X^2 = 24.76$ ,  $p < .05$ . The difference between the second and third audits was also significant,  $X^2 = 22.66$ ,  $p < .05$ .

### **3.3 Survey**

Subscales of perceived top management commitment (3-item scale,  $\alpha = .84$ ), perceived internal environmental orientation (4-item scale,  $\alpha = .82$ ), and attitudes towards workplace energy conservation (3-item scale,  $\alpha = .81$ ) were calculated. All scales were found to have acceptable reliability (Nunnally, 1978; Tabachnick & Fidell, 2001). The four self-reported behaviour items did not form a reliable scale,  $\alpha = .47$ , and therefore were analysed individually. There was only one item each for descriptive norm, subjective norm, and knowledge about energy conservation, and therefore these were also analysed individually.

Figure 3 depicts the changes in self-reported energy conservation behaviour before and after the Turn It Off campaign. The difference in the mean score on the first item, "turn off lights in unoccupied rooms" between baseline and follow-up was significant,  $t(111) = -3.17$ ,  $p = .002$ , such that participants reported

turning off lights more often after the Turn It Off campaign ( $M = 3.81$ ) compared to before ( $M = 3.44$ ). The difference in the mean score on the second item, “shut down your computer before leaving the office” between baseline and follow-up was significant,  $t(111) = -4.40, p < .001$ , such that participants reported turning off computers more often after the Turn It Off campaign ( $M = 4.19$ ) compared to before ( $M = 3.62$ ). The difference in the mean score on the third item “unplug chargers when not in use” between baseline and follow-up was significant,  $t(111) = -4.63, p < .001$ , such that participants reported unplugging chargers when not in use more often after the Turn It Off campaign ( $M = 3.94$ ) compared to before ( $M = 3.31$ ). Finally, the difference between scores on fourth item “turn off air-conditioners when leaving the office” between baseline and follow-up was significant,  $t(52) = -2.13, p = .038$ , such that participants reported turning off air-conditioners more often after the Turn It Off campaign ( $M = 3.64$ ) compared to before ( $M = 3.26$ ).

**Figure 3: Changes in Self-Reported Energy Conservation Behaviours**

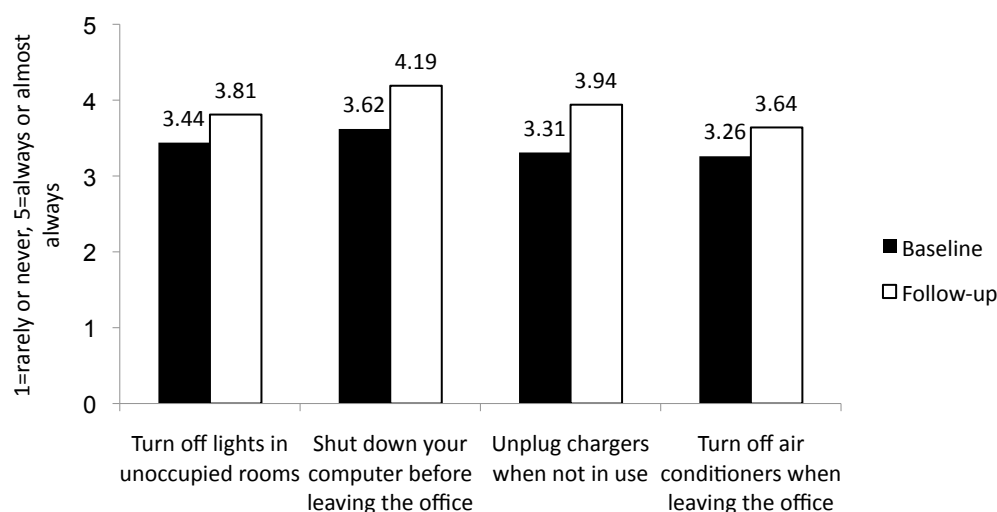
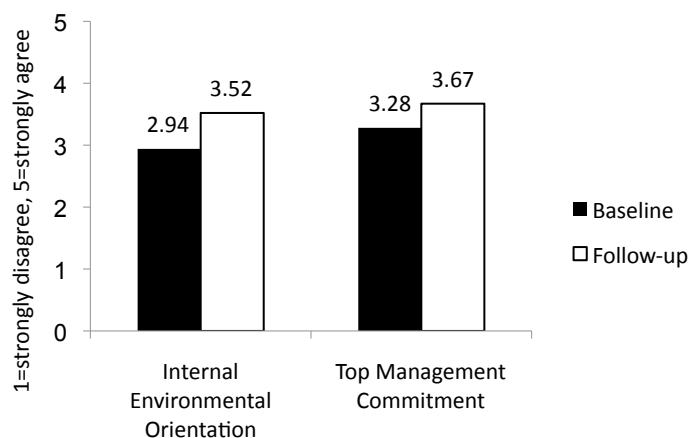


Figure 4 depicts the changes in perceived top management commitment and internal environmental orientation in the organisation before and after the Turn It Off campaign. The difference in perceived top management commitment between baseline and follow-up was significant,  $t(107) = -5.66, p < .001$ . Participants reported stronger top management commitment after the Turn It Off campaign ( $M = 3.68$ ) compared to before ( $M = 3.28$ ). Similarly, the difference in perceived internal environmental orientation between baseline and follow-up was also significant,  $t(107) = -7.66, p < .001$ . Participants perceived a more positive internal environmental orientation after the Turn It Off campaign ( $M = 3.52$ ) compared to before ( $M = 2.94$ ).

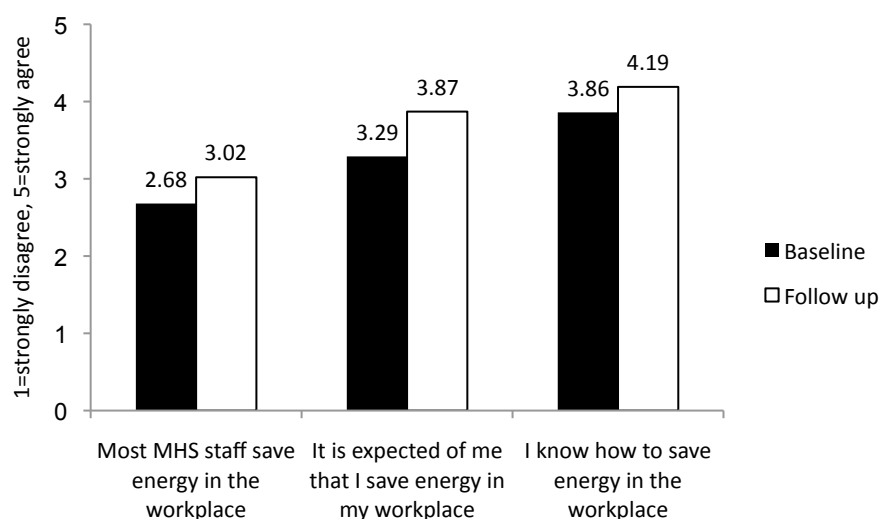
**Figure 4: Changes in Corporate Environmental Climate**





The difference in descriptive norms between baseline and follow-up was significant,  $t(106) = -3.91$ ,  $p < .001$ . Participants perceived that more staff saved energy in the workplace after the Turn It Off campaign ( $M = 3.02$ ) compared to before ( $M = 2.68$ ). The difference in subjective norms between baseline and follow-up was significant,  $t(106) = -5.63$ ,  $p < .001$ . Participants perceived greater expectations of energy conservation after the Turn It Off campaign ( $M = 3.87$ ) compared to before ( $M = 3.29$ ). The difference in knowledge regarding energy conservation between baseline and follow-up was significant,  $t(105) = -4.77$ ,  $p < .001$ . Participants reported greater knowledge regarding how to save energy in the workplace after the Turn It Off campaign ( $M = 4.19$ ) compared to before ( $M = 3.86$ ). Finally, attitudes towards workplace energy conservation did not significantly change throughout the study,  $t(101) = -.68$ ,  $p = .495$ . The mean before the Turn It Off campaign was 4.65, compared to 4.68 after the campaign. Figure 5 depicts the changes in norms and knowledge about energy conservation behaviour before and after the Turn It Off campaign.

**Figure 5: Changes in Norms and Knowledge of Energy Conservation Behaviour**



#### 4. Discussion and Conclusion

Consistent with previous research, the current study shows that prompts are an effective way of encouraging energy conservation behaviours (Lehman & Geller, 2004; Osbaldiston, 2004; Osbaldiston & Schott, 2011; Schultz et al., 1995). Our research extends previous findings by testing the application of prompts in a workplace setting. We found that prompts were a successful intervention strategy for behaviours with a strong element of individual responsibility, such as turning off computer monitors and hard drives. The current study also demonstrated that top management commitment is a successful strategy to encourage energy conservation behaviours in the workplace, and again, this is consistent with previous research (Banerjee et al., 2003). Further, the current study has successfully addressed two limitations of previous research: (1) the use of self-reported measures as an indicator of behaviour; and (2) the lack of research conducted in workplace settings (Lehman & Geller, 2004).

Results from the survey demonstrated that the Turn It Off campaign resulted in positive changes in self-reported energy conservation behaviour, perceived top management support, perceived internal environmental orientation, subjective norms, descriptive norms, and knowledge of energy conservation behaviour. There were no changes in attitudes, however it should be noted that this is most likely due to a ceiling effect (attitudes towards energy conservation behaviour were quite high at baseline and remained high at follow-up). The results of the energy audits were mixed. For computer monitors and hard drives the results showed that the Turn It Off campaign was effective at increasing the proportion of appliances turned off, and these findings were maintained at a six month follow-up. However, for lights the results were not as consistent – in fact, the reverse effect was found.

One possible explanation for the mixed energy audit findings could be that computer hard drives and monitors are behaviours that have a strong element of individual responsibility, whereas lights are often shared resources and thus there is a diffusion of responsibility for those appliances (particularly in shared or open plan offices). Story and Forsyth (2008) argued that responsibility is an antecedent to behavioural and contribution intentions, and that awareness (both directly and indirectly through appraisal) of an issue leads to a sense of personal responsibility for that issue. Future research in this area should examine the role of responsibility for different appliances, and compare the effectiveness of prompts for individual offices versus shared/open plan offices. Prompts may work well for behaviours with an element of individual responsibility, but another approach may be required for collective behaviours, or behaviours where there is a diffusion of responsibility.

As with most field research, there are some limitations that need to be acknowledged. The study utilised a pre-test post-test design, however an ABAB design would have been more conclusive (see Sussman & Gifford, 2012). An ABAB design could not be utilised in the current study, as this was not consistent with the organisation's goals. Because the organisational aim was to promote energy conservation behaviour it was not possible to implement and then remove the intervention during the course of the study as would be required by the ABAB design. A second limitation was the absence of a control group. Again, it was not in line with the organisation's goals to apply the intervention to some staff members and not others, thus the intervention was applied to all staff members.

Another factor to consider is habituation to prompts. De Young (1993) argued that prompts are ineffective in the long-term, particularly once people become habituated to them. Our research showed that the intervention was successful for individual behaviour after a six month period. However, future research would be valuable to test the effectiveness on a longer time scale. Research has shown that once a prompt is removed, behaviour can return to baseline levels (De Young, 1993). Future research would be of benefit to monitor the effectiveness of prompts and whether or not the target audience becomes habituated to them. Strategies to reduce habituation in workplace settings could also be tested. Making a change to the prompt (stimulus specificity) and introducing a new prompt (dishabituation) are two techniques known to reduce habituation to stimuli in lab studies (McSweeney, 2004), but this remains to be tested in workplace settings.

Finally, the role of internal environmental orientation could be explored further. In the current study, internal environmental orientation was measured but not manipulated. Since culture is an important variable in organisational change for sustainability (Russell & McIntosh, 2011), it is likely that the internal environmental orientation of the organisation had an effect on participants' willingness to engage in energy conservation behaviour. Future research that examines the effect of the internal environmental orientation of the organisation would be of benefit in this area.

This paper extends previous research on prompts and top management commitment and demonstrates that these strategies are an effective way of encouraging energy conservation behaviours in the workplace. Further, the use of prompts in conjunction with top management commitment can lead to positive changes in perceptions of top management commitment and internal environmental orientation. The opportunities for future research in the area of workplace pro-environmental behaviour are vast, and include examining the role of responsibility, habituation, and internal environmental orientation.

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