

Bond University
Research Repository



**The human green office experience
Happy and healthy or sick and frustrated**

Armitage, Lynne; Murugan, Ann

Published in:
The Australian and New Zealand Property Journal

[Link to output in Bond University research repository.](#)

Recommended citation(APA):
Armitage, L., & Murugan, A. (2013). The human green office experience: Happy and healthy or sick and frustrated. *The Australian and New Zealand Property Journal*, 4(1), 35-41.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

For more information, or if you believe that this document breaches copyright, please contact the Bond University research repository coordinator.

3-1-2013

The human green office experience: Happy and healthy or sick and frustrated?

Lynne Armitage

Bond University, Lynne_Armitage@bond.edu.au

Ann Murugan

Bond University, Ann_Murugan@bond.edu.au

Follow this and additional works at: http://epublications.bond.edu.au/sustainable_development



Part of the [Environmental Design Commons](#), [Place and Environment Commons](#), and the [Work, Economy and Organizations Commons](#)

Recommended Citation

Lynne Armitage and Ann Murugan. (2013) "The human green office experience: Happy and healthy or sick and frustrated?" *The Australian and New Zealand Property Journal*, 4 (1), 35-41: ISSN 1836-6635.

http://epublications.bond.edu.au/sustainable_development/218

THE HUMAN GREEN OFFICE EXPERIENCE: HAPPY AND HEALTHY OR SICK AND FRUSTRATED?

Please note: The published version of this paper can be found via the *Australian and New Zealand Property Journal* website: <http://www.api.org.au/menuitem/about-api/anz-property-journal>

ABSTRACT

Adopting the proposition that the effect on people using, interacting or working in a 'green' workplace environment is not currently clear nor fully understood, the purpose of this research is to examine what the green workplace environment is like from the perspective of one of this sub group – the users'/employees' – especially when it comes to satisfaction levels and health outcomes. This study examines and compares responses between employees in green and in non-green workplace environments in order to determine if a gap exists between the satisfaction and health levels of these two groups.

The survey covers 351 employee respondents occupying ten green office buildings (Green Star-rated in accordance to Green Building Council Australia) and 159 employee respondents occupying eleven non-green office buildings.

The findings from this study are clear: the human benefits of a green workplace are massive. Employees in green workplace environments consider themselves to be happier and healthier than employees in non-green workplace environments. The large sample of office space users provides empirical evidence of what sets green workplaces apart from non-green, and provides a good reference point for similar studies in the future, leading to the establishment of clearer, more useful benchmarks of green building occupier satisfaction and health.

The findings from this study are useful for green building industry practitioners, business managers, occupants and health professionals and will deepen their understanding of the green workplace environment and its impact on employees.

Keywords – Sustainable, Employee Satisfaction, Health, Office buildings, Workplace, Australia

1. INTRODUCTION

‘Green’¹ office buildings are better for the environment. They use fewer materials to construct. They use more recycled and recyclable non-toxic, environmentally-friendly materials to build, use less energy and water during their operation, are easier to reuse at the end of their lifecycle and are far more sympathetic to the local environment and fauna amongst other benefits (GBCA, 2011; NABERS, 2011, Thomas 2010). All this has been commonly accepted and the benefits are very tangible and real. What is still not fully accepted, however, is how ‘green’ workplace environments affect the people using, interacting and working in them. For example: what benefits do employees get out of working in green workplace environments? Better general wellbeing and health? Increased satisfaction levels? Or does a green workplace environment lead to increased frustration? These are some of the questions addressed in the study reported here.

2. THE GREEN WORKPLACE ENVIRONMENT

What signifies a green workplace environment? A green workplace environment sets itself apart as a result of a myriad of complex factors including an effective fresh air intake, abundance of daylight and views from workstations as well as usage of non-toxic materials. Green workplaces also generally offer higher individual controllability of, for example, temperature and ventilation and, more often than in non-green buildings, make good use of indoor plants to clean the air as well as giving the office space a greener feel. Additionally, behind the scene so to speak, green buildings make best possible use of passive solar design principles (increased thermal comfort by making it cooler in summer and warmer in winter), use high frequency electronic ballasts to eliminate disturbing flicker from artificial lighting, use building design and materials that discourage growth of moulds and dust mites (GBCA, 2011).

3. OCCUPIER SATISFACTION AND HEALTH

3.1 Satisfaction

According to the much of current research, there is evidence that the green workplace produces more satisfied and productive employees (Fisk, 2000; Palmer and Mariscal, 2002; Kumar and Fisk, 2002; Singh *et al.*, 2010; Miller and Porge, 2009; Smith and Pitt, 2011). Similarly, recent Australian studies show high satisfaction levels

¹ In this study, ‘green’ refers to offices that have a Green Star certification in accordance to the Green Building Council Australia’s rating system (GBCA, 2011). ‘Non-green offices’ refers to all other offices.

amongst users of green workplaces. For example, Rask and Kato (2008) found in their study based on 12 Green Star rated buildings and their occupants that 100 per cent of employees and employers alike thought that the green building was 'better than expected with all things considered' and that the large majority of these people were happy with their 'green' space signalling that they wouldn't like to relocate to a non-green office building. This study found that employees were the 'most satisfied' with the function of artificial lighting, amounts of natural daylight and the freshness of the air. On the other hand, more personalized issues such as the ability to control personal comfort to their liking, level of surrounding noise and level of privacy showed the highest dissatisfaction levels.

Another Australian study based on 22 green buildings and 23 non-green buildings shows that, from the users' perspective, the top green buildings consistently outperformed the top non-green buildings, especially so when it came to thermal comfort and forgiveness i.e. tolerance of things that are less than optimal. However, the same study showed that when the whole dataset was included, non-green buildings outperformed green in respect of thermal comfort and the results showed that many users in green buildings experienced thermal discomfort by being too hot in summer and too cold in winter (Leaman *et al.* 2007).

3.2 Health

Some research goes one step further, claiming that green office buildings do not only contribute to higher satisfaction levels amongst occupants but also contribute to better health (Frumkin, 2003). Regarding the positive aspect of health, not as much research currently exists although the assertion has been held for a number of years (e.g. Roodman and Lenssen, 1995). Principally, the focus has been on the satisfaction and productivity outcomes of green buildings but, as of today, little detailed research has yet been undertaken regarding potential positive health outcomes.

However, the other side of the equation has been researched extensively i.e. how buildings with bad indoor environmental quality – those buildings with the so-called 'sick building syndrome' – have been shown to be responsible for sickness of occupants. For example, approximately 50 per cent of office buildings in Australia are suspected of causing ill health amongst their occupants and there seems to be a strong link between the period of time spent in unhealthy indoor environments and the increasing frequency of illnesses such as allergies, asthma and eczema in our society (Standing Committee on Public Works, 2001).

Thus, buildings with poor indoor environmental quality may well influence people's health negatively and the relatively little research that has been done so far shows that buildings with good indoor environmental quality seem to influence people's health positively. For example, a U.S. study by Sing *et al* (2010) based on two case studies showed that employees who moved from a non-green office building to a green one experienced a reduction in perceived absenteeism and loss of work hours caused by asthma, respiratory allergies, depression and stress in the green work environment compared to that in a non-green work environment.

These findings were supported by a study by Rask and Kato (2008) which found that 80 per cent of employers believed staff absenteeism amongst employees had decreased since they moved into their new Green Star rated building. Another example from a study by Armitage, Murugan and Kato (2011) show that 89 per cent of the employers did believe their green workplace environment had a positive impact on the health of employees. However, by strong contrast, only 32 per cent of staff believed their green office environment had a positive impact on their health.

4. METHODS

4.1 Sample selection

To conduct the research, two different sample groups were selected: firstly, employees working in green buildings and, secondly, employees working in non-green buildings. The aim was to gain data from people working in green as well as non-green buildings and thus be able to compare the results. In this study, the term *green offices* refers to offices with a Green Star certification in accordance with the Green Building Council Australia's rating system (GBCA, 2011). *Non-green offices* refers to all other offices. The occupiers of ten green (Green Star certified buildings) and eleven non-Green Star certified buildings participated in this research.

The criteria for inclusion for being in the green data set were: located in Australia; operating as an office in either the private or public sector; operational for 12 months or longer; and being Green Star certified in accordance with the Green Building Council Australia's rating system (GBCA, 2011). Similarly, the criteria for inclusion for non-green office environments were: located in Australia; operating as an office in either the private or public sector; operational for 12 month or longer, but *not* being Green Star certified.

4.1.1 Green data sample

At the initiation of this research in late 2009, there were 107 Green Star certified buildings in Australia that had been operational for 12 months or longer. A letter inviting participation in the research was forwarded to the owners of all these Green Star rated buildings. They in turn helped to put the research team in touch with the business managers of the tenants who, if they agreed to participate, distributed the survey to their employees.

Business managers from ten buildings agreed to participate in the employee online surveys, which accounted for 9 per cent of the total population of 107 targeted buildings. The sample buildings were located in Sydney, Melbourne, Adelaide and Gold Coast. Their Green Star rating was based on 'Office Design', 'Interiors' and 'Education' categories with the buildings having been awarded between four to six star ratings. Online questionnaires were distributed through the business managers to their employees through the Survey Monkey® data collection tool. The total of employee responses was 351 with each individual building having a response rate of a minimum of 30 per cent.

4.1.2 Non-green data sample

Initial contact was established through a phone call or email inviting participation in the research which was forwarded to business managers in non-green buildings. Business managers from eleven buildings agreed to participate in the employee online surveys. The sample buildings were located in Brisbane, Gold Coast, Sydney and Perth. None of these buildings has a Green Star rating thus in this survey they are referred to as non-green.

Online questionnaires were distributed by business managers to their employees via the Survey Monkey® data collection tool. The total of employee responses was 159 with each individual building having a response rate of a minimum of 30 per cent.

The profile of the participating buildings was green: 10 offices and non-green: 11 offices, most of which were of almost identical size. The relatively big gap between participating employees between green (351) and non-green (159) is explained by the green data sample having one large building with 177 participating employees accounting for much of the difference.

4.2 Questionnaire design

The employee survey, distributed online, asked questions about the respondent's general profile, satisfaction levels, functionality and self-assessed health impacts. A range of question formats was employed including a five point (Likert) scale for the majority of questions; 'yes', 'no' or 'not sure' for others and a few required open ended questions to be answered.

Responses between employees in green and non-green workplace environments were compared in order to determine if a gap exists in the satisfaction and health levels between these two groups. The data were analysed to identify if there is any social benefit to working in a green workplace.

This concludes the discussion of the methodology used in the study and the findings will be considered in the following section.

5. RESULTS AND DISCUSSION

The results are discussed in two sections: firstly, satisfaction levels between employees in green and non-green work environments are analysed and, secondly, health and general wellbeing amongst employees in green and non-green work environments are discussed. Based on the literature reviewed, it was expected that employees in green work environments would experience higher levels of satisfaction and also be healthier compared to employees in non-green work environments which the findings confirmed.

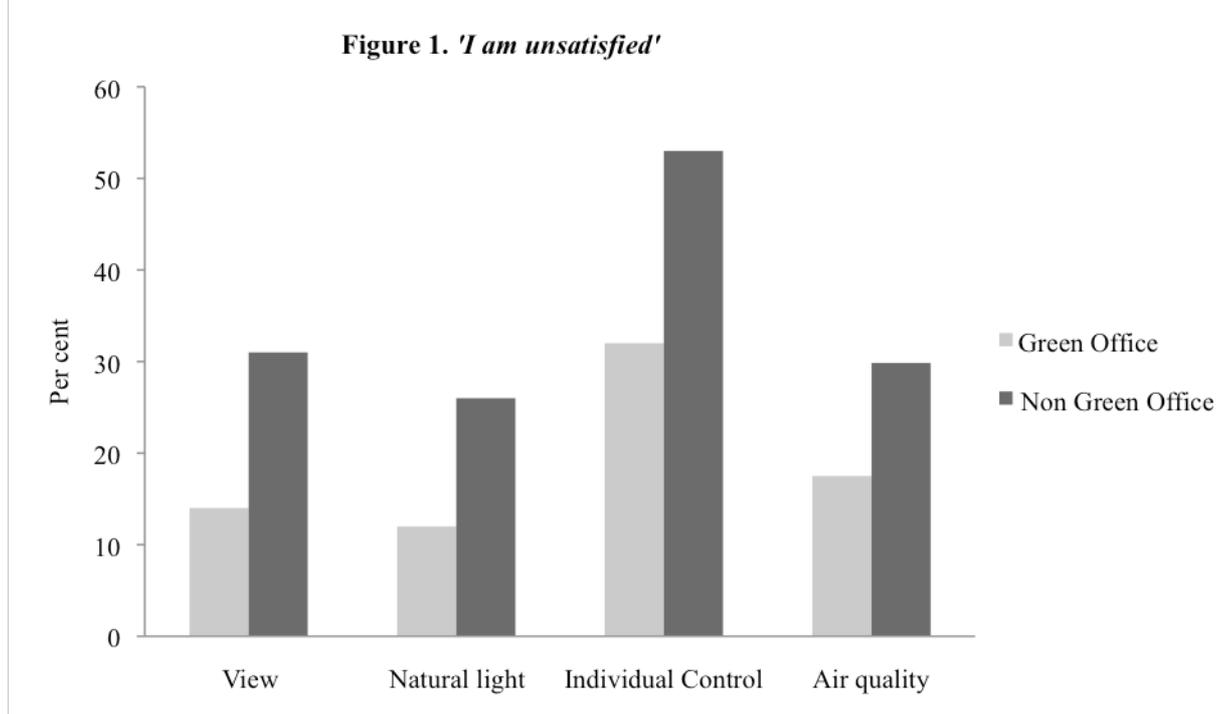
5.1 Satisfaction

Green offices outperformed non-green offices in all aspects of satisfaction. People in green office buildings were happier both with the office space overall and with the features within it. For example, green buildings really set themselves apart when it came to satisfaction levels of air quality, daylight, views and individual control i.e. the ability to change air flow, temperature, lighting etc to their liking.

“The natural light, open air and presence of office plants help make this a very agreeable office to work in. Being able to have my window open and hear the birds and see the trees outside is important to me.”

Belinda (working in a green office building)

Figure 1. 'I am unsatisfied'



Employees were asked to rate their levels of satisfaction in connection with the work they usually do in the office regarding the following aspects: 'A view from the nearest window', 'Level of natural daylight', 'Air quality (stuffy, dusty, odour, etc)', 'Your ability to change lighting, air flow, temperatures, etc'. On average, twice as many people were dissatisfied in non-green buildings compared to green buildings (Figure 1).

"My office is really a glorified broom closet with no window to the outside and no natural light. This is probably the worst office space I have had to work in for over 30 years and I am depressed every day. I love my job, but I absolutely hate the space I am expected to perform my duties from."

Ingrid (working in a non-green office building)

This study shows that people in green buildings, more often than people in non-green buildings, have the privilege of having their work desk close to a window enabling them to stay connected to the outdoor environment. They also enjoy more natural light and breathe fresher air as well as having a higher sense of control over the function of the space they are in. All these attributes seem to be correlated to high overall satisfaction levels. Certification bodies such as the Green Building Council Australia's Green Star rating system plays an important role in making sure these attributes are integrated into green workplace environments, since it's more or less required in order to achieve a Green Star rating.

"It is quite a nice office but I just feel 'closed in' and 'stuffy' as there is no connection to the outside and no individual control over the air-conditioning or access to fresh air."

Robert (working in a non-green office building)

To the research team's surprise, staff in green offices were also happier with the air temperature. Existing research indicate that it's difficult to achieve comfortable thermal conditions (nor too hot or too cold) in natural and mixed mode ventilated buildings. This is probably the case but our study shows that it is *even more difficult* in buildings with conventional heating and cooling. If you work in a green building, *you are 38 per cent more likely to be comfortable* with the temperature than you would if you were working in a non-green building.

As discussed earlier in the Introduction, there are often higher levels of individual control built into the heating/cooling systems (for example, operable louvres, windows, blinds, fans etc) in green buildings rather than one central temperature control unit as is the case in conventional non-green office buildings. The findings of this research support the perception that people tend to have a higher tolerance of discomfort when they at least have the power to make adjustments. And, on the other hand, they tend to have very little (zero) tolerance when all control and power is taken away from them and given to the facilities management computer system or to facilities managers.

While the survey found people were more satisfied overall with the thermal comfort in green buildings compared to non-green buildings; when asked in the open ended question 'Please describe your biggest complaint about your office or workspace?', air temperature was the number one complaint in *both* green and non-green buildings. Improvement to thermal comfort would benefit office workers, regardless of type of building they work in.

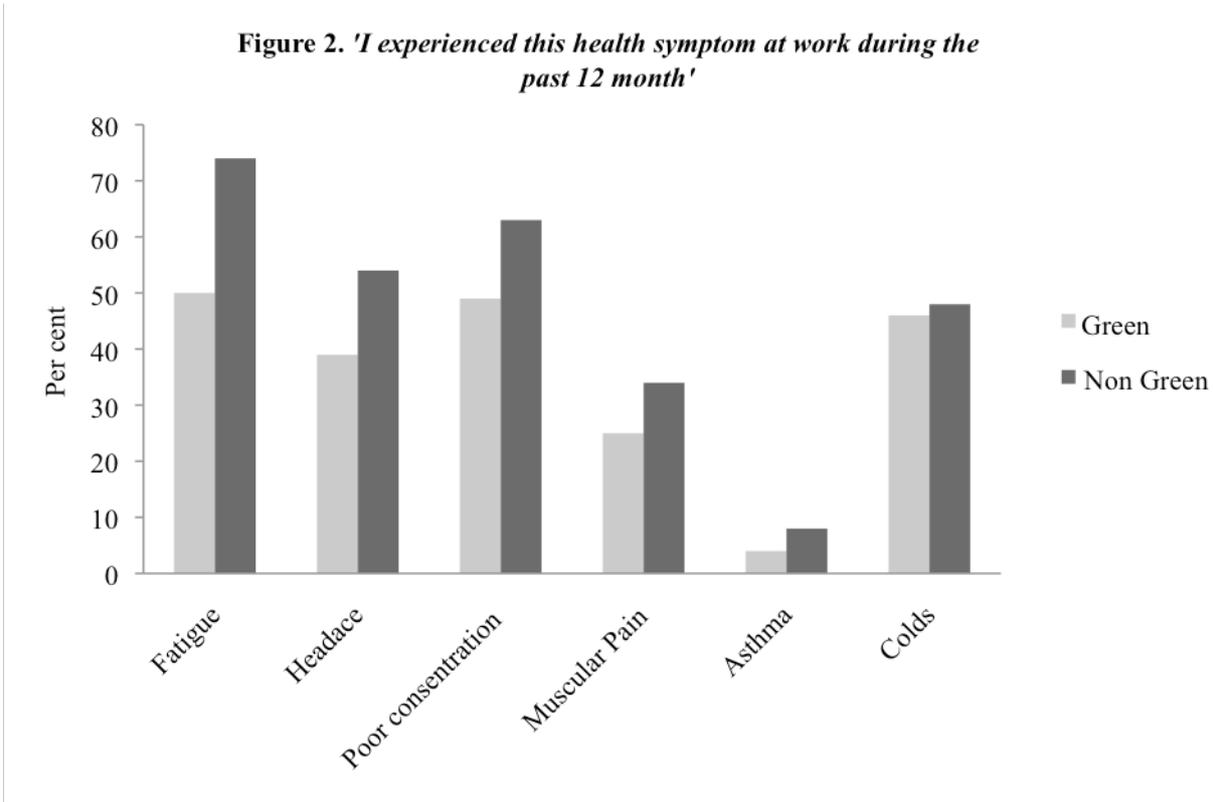
When asked the open ended question 'In your opinion, what is the BEST THING about this office or workspace?', abundance of natural light was the most favoured aspect in green workplaces and in non-green workplaces, and 'people' were the most common favourite thing amongst staff.

"To change the temperature in here, I have to call somebody in another building to do it for me. For example, the a/c was still on -- making it freezing in here -- for several weeks after it got cold until I finally called and had somebody turn on the heat. It would be nice to have more control over the climate, as I had at my last job."

Thor (working in a non-green office building)

5.2 Health

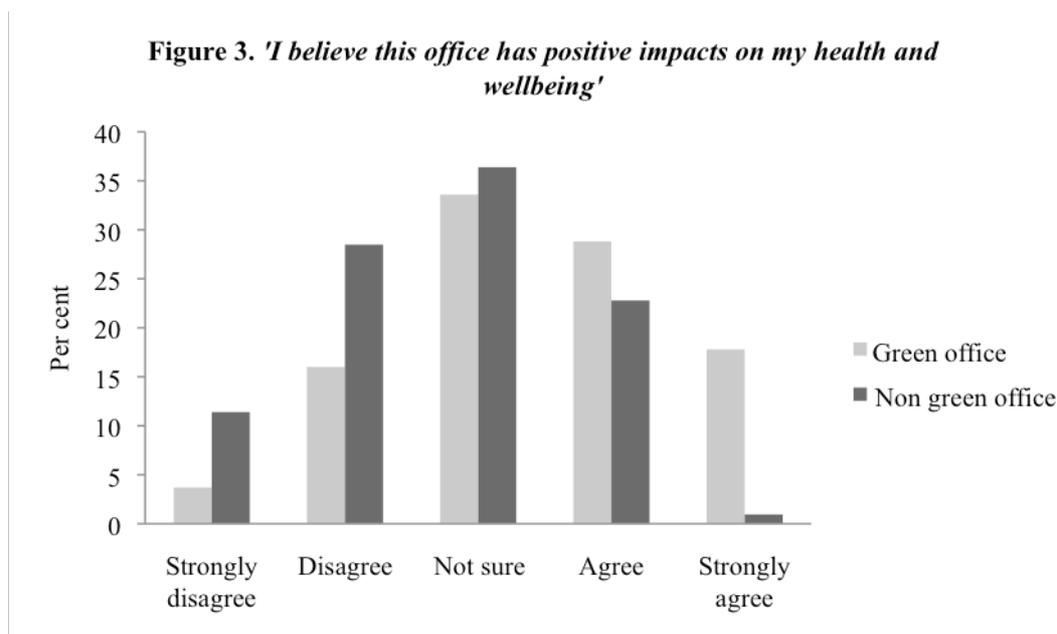
People who work in green buildings are healthier as they report experiencing fewer bad health symptoms such as asthma, fatigue, headache, poor concentration, asthma and muscular pain. For example, when asked ‘Did you experience any of the following symptoms AT WORK during the past 12 months?’ 4 per cent of people in green workplaces experienced asthma compared to 8 per cent in non-green workplaces. 50 per cent of people in green workplaces compared to 74 per cent in non-green experienced fatigue. 39 per cent in green compared to 54 per cent in non-green experienced headaches. 49 per cent in green compared to 63 per cent in non-green workplaces experienced poor concentration. 25 per cent in green compared to 34 per cent in non-green workplaces experienced muscular pain. When it came to the experience of colds, the difference between the two groups was insignificant: 46 per cent in green and 48 per cent in non-green had experienced colds in the last 12 month (Figure 2).



An additional question was asked about each health symptom nominated by respondents in regards to whether or not the respondent’s health got better when away from work. This extra question was asked with the purpose of finding out if there was a link between the symptom experienced and the person’s work environment. Staff in non-green work environments reported that their health improved when they were away from the office more often than did staff in green work environments, especially when it came to fatigue, poor concentration,

headache and muscular pain. Thus, it can be concluded that when people experience negative health symptoms in non-green buildings, they are more likely to be related to the building's indoor environmental quality.

The above findings which demonstrate that people in green work environments are healthier than people in non-green were supported by the responses to the question 'I believe this office has positive impacts on my health and wellbeing'. The majority of people in green work environments perceived that their building has a positive impact on their health and wellbeing: 47 per cent believed so, 33 per cent weren't sure and 20 per cent disagreed with the statement that their office had a positive impact on their health. This perception is reversed amongst people in non-green work environments. In this case, the majority didn't believe their building has a positive impact on their health and wellbeing: 24 per cent did believe it had a positive impact on their health, 36 per cent weren't sure if it did and 40 per cent didn't believe so, as shown in Figure 3.



“We need to move out of this toxic space into a new environmentally friendly building asap.”

Samuel (working in a non-green office building)

6. CONCLUSIONS

So what do employees get out of working and operating in green office buildings? The human benefits from the green workplace are massive. The findings from this study are clear: Employees in green workplace environments have a happier and healthier existence than employees in non-green workplace environments.

Green workplaces perform better compared to non-green in all categories. For example, green workplace environments scored higher satisfaction levels in the areas of thermal comfort, natural light, views, air quality and individual controllability as well as experiencing considerably fewer instances of asthma, headache, muscular pain, fatigue and poor concentration.

Human beings require certain environmental conditions in order to function well both physically and psychologically. If we assume that access to natural light, views to the outside, clean air and individual controllability are part of people's essential needs, it would thus explain why these attributes contribute to happiness and health in such a big way for the people working in green office environments as demonstrated by the findings of this study.

Core finding: Green office buildings not only contribute to a happier and healthier planet but also to happier and healthier people!

7. REFERENCES

Armitage, L., Murugan, A. and Kato, H. (2011), 'Green offices in Australia: a user perception survey.' *Journal of Corporate Real Estate*. Volume 13 Issue 3 pp. 169-180.

Fisk, W.J. (2000), 'Health and productivity gains from better indoor environments and their relationship with building energy efficiency', *Annual Review of Energy and the Environment*, Vol. 25 No.1 pp. 537-66.

Frumkin, H. (2003), 'Healthy Places: Exploring the evidence.' *American Journal of Public Health*, Vol. 93, No. 9. pp. 1451-1456.

Green Building Council Australia (2011). Website: www.gbca.org.au

Kato, H., Too, L. and Rask, A. (2009), 'Occupier perception of green workplace environment: the Australian experience'. *Journal of Corporate Real Estate*, Vol. 11 No. 3. pp. 183-195.

Kumar, S. and Fisk, W.J. (2002), 'Promoting Workplace Productivity and Health: Final Report Lawrence', *Berkeley National Laboratory*, Berkeley, CA.

Leaman, A., Thomas, L. and Vandenberg, L. (2007), 'Green' buildings: What Australian Building Users are saying.' *Ecolibrium, the Journal of Airah*, Vol. 11. pp. 22-30.

Miller, N. and Pogue, D. (2009), *Do Green Buildings Make Dollars and Sense?* University of San Diego. Burnham-Moores Center for Real Estate.

National Australian Built Environment Rating System (2011), Website: www.nabers.com.au

Palmer, M. and Mariscal, A. (2002), '*Green Buildings and Worker Productivity: Review of the Literature*, San Francisco Environment', San Francisco, CA.

Rask, A. and Kato, H. (2008), *Enhancing Performance of Green buildings: Report 2008. Occupiers of Green Star rated building experience on how to make the best use of it*. Bond University's Mirvac School of Sustainable Development in collaboration with the Green Building Council Australia.

Roodman, D.L. and Lenssen, N. (1995), '*A building revolution: How ecology and health concerns are transforming construction*', Worldwatch Institute, Washington, pp.45.

Singh, A., Syal, M., Grady, S. and Korkmaz, S. (2010), 'Effects of Green Buildings on Employee Health and Productivity', *American Journal of Public Health*, Vol. 100 No. 9, pp. 1665-1668.

Smith, A. and Pitt, M, (2011), 'Sustainable workplaces and building user comfort and satisfaction', *Journal of Corporate Real Estate*, Vol.13, Iss. 3, pp. 144-156.

Standing Committee on Public Works. (2001), *Sick Building Syndrome*. Report No. 52/7. Public Works NSW.

Thomas, L.E. (2010), 'Evaluating design strategies, performance and occupant satisfaction: a low carbon office refurbishment', *Building and Research Information*, Taylor & Francis.