THE RESTORATIVE EFFECTS OF GREEN SPACES WITH ANIMALS ON STRESS

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ABSTRACT

Past research on restorativeness has concentrated mainly on the potential of vegetation, scenic environments, parks, and open spaces rather than on natural environments with animals. At present, the restorative effects of green spaces with animals on people's general well-being and psychological stress remain unclear. This study argues that green spaces with animals, such as zoo, are also likely to have a restorative influence on human psychological stress and overall well-being. A between-group experiment was conducted, in which 80 randomly selected visitors of the Malaysian National Zoo were asked to answer two scales, i.e. the adapted Kessler Psychological Distress Scale (K10) and the Perceived Restorativeness Scale (PRS). Results showed that, contrary to the hypothesis, there is no significant relationship between stress and restorative effects of the green spaces with animals. However, statistical data indicate that most participants reported experiencing higher levels of restorative effects and lower levels of stress after they visited the zoo. These findings are generally supportive of cognitive model of attention restoration and point to the importance of enhancing the restorative qualities of the zoo's environment and rebuilding the unity between man and nature.

Keywords: *restorative effects; stress recovery; zoo; green spaces; environmental psychology*

INTRODUCTION

A sizeable amount of literature has reported the influence of nature on social, psychological, and physical well-being. For example, having contact with nature can be a positive predictor of effective functioning (Herzog &Strevey, 2011) while the experiences of visiting and enjoying green spaces promote restoration and recovery from stress (Groenewegen et al., 2001; Maas et al., 2009).Additionally, a study by Ward et al. (2012) demonstrated that people's stress levels are directly related to the amount of green space they have in their immediate surroundings. In particular, they found that people living in areas with more green spaces are more capable of coping with disruptive events, either by not getting stressed by them in the first place or coping with them better.

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The restorative or recovery aspectof the environment has been described by Kaplan and Kaplan (1989) as a process that can readily illustrate the relationship between man and the environment.'Restorative effects', which canbebroadly defined as a "*positive affective response, a behavioural approach orientation, and a sustained, wakefully relaxed attention" (*Hansman, Hug, &Seeland, 2007; p. 214*)*, are assumed to be present in environments that have four components; i.e. being away, extent, compatibility, and fascination (Kaplan, 1995). Collectively, these components made up restorative effects, hence, facilitate recovery from mental fatigue.

The restorative effects of nature and green spaces are relatively well established in the literature. These places, which may include nature reserves, woodlands, and parks, arereported to elicit greater positive changes in self-reported health and psychological well-being, including reduced health complaints, decreased physiological arousals, as well as better mental health (Aziz, 2012; Berg et al., 2010; Cheung & Wells, 2004; Ulrich, 1984).Contact with green spaces and natural environments can also provide relaxation, increase positive emotions, and gain relief from stress (Ulrich, 1984). Green spaces and urban parks users have also reported better general perceived health, more physical activity and relaxation, restored attention fatigue, and faster recovery of attention-demanding cognitive performances (de Vries et al., 2003; Kaplan&Kaplan, 1989; Payne et al., 1998). At this point, it is fair to say with reasonable confidence that the restorative effects of nature and green spaces can have beneficial impact on individuals' stress level and physical functioning (Kaplan, 1995).

While studies on nature's restorative effects have been widely explored, very limited research, however, has attempted to examine the restorative effects of green spaces with animals, such as zoos. Animals could be a major contributing variable in the restorative effects of green spaces. For example, Jorgenson (2007), who reviewed literatures on the human-animal interaction in hospitals, found that having a pet can help patients to recover from their physical illness. A study by Griffin et al. (2011) also reported that animals can be a positive intermediary for mental wellness and stress management.

Despite the evidencesuggesting the positive effects of animal interaction on human well-being, the role of green spaces with animals in restorative and stress recovery process had been discussed only in a limited number of studies. Onesuch research was by Maller et al. (2009), who reported that the interactions between animal, green spaces, and both animal with green spaces have a restorative effects on the interactors. In another study, which investigated the interaction between

humans and zoos or aquariums, found some significant changes among visitors; but restorative effects of these places were not significantly found(Falk et al., 2007).While these studies are useful in highlighting the human-animal interactions, they do little to illuminate the effects of green spaces with animals on people's general well-being and stress. Given the limited amount of work conducted in this research area, it is therefore important to discover the extent to which green spaces with animals can contribute to restorative and stress recovery process among individuals.

Bearing these points in mind, this study therefore seeks to investigate the restorative effects of green spaces with animals on psychological well- being, particularly stress. Consequently, it is hypothesised that there will be a noticeable reduction in people's stress levels and an increase in restorative effects after visiting green spaces with animals. This study is important in the area of restorative environments for two reasons. First,it provides some empirical data on the extent and effects of green spaces with animals on stress, hence improve our understanding on the restorativeness and healing nature of this environment. Second, it could raise awareness of the needs and importance of enhancing the restorative qualities of the green spaces with animals, particularly zoo's environment, and rebuilding the unity between man and nature.

METHOD

Research design

A between-group survey design was used to compare visitors who had not entered the zoo (pre survey group) with those who were exiting the place (post survey group) on measures of stress and restorative effects. Each group is independent of the other. This approach was taken in order to minimise delay in data collection as it is challenging to secure identical participants for both pre and post surveys.

Questionnaires were distributed to visitors of Zoo Negara, Kuala Lumpur, Malaysia. These questionnaires were divided into a pre and post survey in order to see the differences in the stress levels and restorative effects between the two groups of participants at the entrance and exit of the place. Zoo Negara was chosen as the study location because of its accessibility, diversity of animals, historical significance, and popularity among the general public.

Participants

A total of 80 participants from various nationalities participated in this study (Males = 30; Females = 50). The age range of the participants was from 17 to 50 years (*M*=25.71 years, *SD*= 9.22). Equal number of participants were obtained in both pre and post survey groups.Because gender of the participants was not found to have a strong influence on perceived restorative effects and preference in the literature (e.g. Berto, 2007; Purcell et al., 2001), thisvariablewas not controlled or randomised, and only collected for descriptive purposes.

Materials

Stress was measured usingthe 10 items from the Kessler Psychological Distress Scale (K10: Kessler, 1992). The scale originally aims to measure stress accumulated over a long period of time. As the study's objective was to measure current level of stress experienced by the participants, some changes were made to the original scale to better suit the present study's objectives.In this study, the scale is found to havegood psychometric properties (α = 0.89).

Restorative effects were measured by the Perceived Restorativeness Scale (PRS) developed by Hartig et al. (1997). The scale, which is based on the Attention Restoration Theory by Kaplan and Kaplan(1989), consists of 16 items that assess four components of restorativeness, i.e., being away, extent, compatibility, and fascination. Participants were asked on a 5-point Likertscale the extent to which the given statement fits their experience of the environment. The internal consistency for each components wasacceptable: compatibility (α= .89),fascination (α =.88), extent (α = .71), and being away (α =.64).

Procedure

Participants were approached by the researchers at the entrance and exit of the zoo. Before being presented with the questionnaire, all participants were informed of the nature and aim of the study. Confidentiality of the participant's responses was highlighted and made clear. Only when a verbal consent was obtained, the researchers handed out the questionnaires. Once the questionnaires were completed, the researchers collected the forms and thanked the participants for their cooperation. This procedure was followed until all required responses were collected.

RESULTS

A series of independent t-test analyses were conducted to investigate the differences of stress levels and the restorative effects before and after entering the zoo.

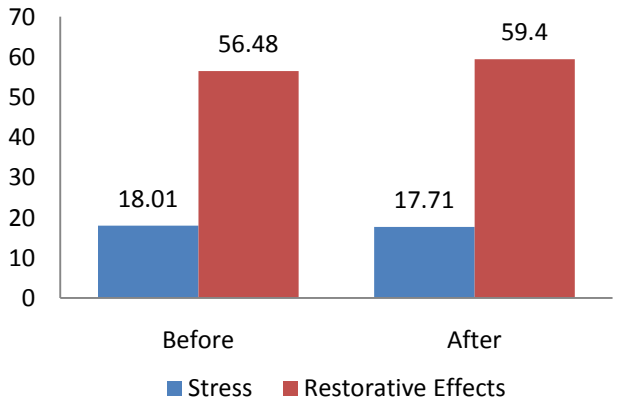
Table 1
Independent t-test results of stress and restorative effects

		M	*SD*	*t*	*df*	*Sig (2-tailed)*
Stress	Before entering the zoo	18.01	7.6	.176	78	.86
	After exiting the zoo	17.71	7.94			
Restorative effects	Before entering the zoo	56.48	11.93	-1.05	78	.30
	After exiting the zoo	59.4	12.79			

Table 1 shows that there is no statistically significant difference in stress levels ($t(78) = .176$, $p = .86$), but there was a noticeable reduction in stress levels between participants before entering the green spaces with animals (M=18.01, SD=7.6) and those who were exiting the zoo (M=17.71, SD=7.94).

There was also no significant difference on the restorative effects between participants before they entered the zoo (M=56.48, SD=11.93) and those who had already entered it (M=59.4, SD=12.79); (t (78) = -1.05, p= .3). Altogether, these results were in the hypothesised direction, although none were statistically significant. This result is also illustrated in Figure 1.

Figure 1
Comparison mean results of visitors' stress and restorative effects before entering and after exiting the zoo



Additionally, Pearson product-moment correlations were used to examine the relationships between stress levels and restorative effects in the pre and post surveys. As shown in Table 2, the data shows a low, negative correlation (r = -.212,p = .189) between these two variables in the pre-survey group (n = 40). In contrast, a low positive correlation(r = .256,p = 0.111) was obtained in the post survey group (n = 40). However, both results are not statistically significant.

Table 2
Correlation of stress and restorative effects

Test	Measure		Restorative Effects
Pre survey	Stress	Pearson Correlation	-.212
		Sig. (2-tailed)	.189
Post survey	Stress	Pearson Correlation	.256
		Sig. (2-tailed)	.111

Correlational analyses were also conducted to examine the correlation between gender and stress and restorative effects in both pre and post surveys. In the pre-survey, it was found that males (n = 16) have a negative relationship for stress levels and restorative effects (r = -.332, p = .209). Similarly, a negative relationship between these two variables were observed (r = -.12, p =.578) among females (n = 24). On the contrary, post-surveys results by males (r = .194, n = 14, p = .505) and females (r = .271, n = 26, p = .181) were positive. Nonetheless, there was

no significant correlation in all of these conditions. The results of these correlations are illustrated in Table 3.

Table 3
Correlation between stress and restorative effects for both genders

Test	Gender	Measure		Restorative Effects
Pre survey	Male	Stress	Pearson Correlation	-.332
			Sig. (2-tailed)	.209
	Female	Stress	Pearson Correlation	-.120
			Sig. (2-tailed)	.578
Post survey	Male	Stress	Pearson Correlation	.194
			Sig. (2-tailed)	.505
	Female	Stress	Pearson Correlation	.271
			Sig. (2-tailed)	.181

DISCUSSION

This study sets out to explore the effects of green spaces with animals in relation to visitors' stress and perceived restorativeness. Using data on visitors of the Zoo Negara, Kuala Lumpur, the findings indicate an overall increased experience of restorativeness and decrease of stress levels after visitors exited the zoo. These results, to some extent, are consistent with the Attention Restoration Theory (ART), which suggests that interaction with environments rich with fascinating stimuli can invoke involuntary attention, allowing directed-attention mechanisms a chance to replenish (Berman et al., 2008). Directed attention in the green spaces with animals is amplified by the restorative effects from the environment. In this study, visitors' directed-attention abilities were captured by the green spaces with animals in the zoo, thus lowering their stress levels. On the contrary, the typical urban environments that we are exposed daily capture people's attention radically and require more effortful directed attention to overcome stimulations received (e.g., avoiding traffics, enduring car horns, ignoring advertising, etc.), which then make the urban environments less restorative (Kaplan, 1995). These findings therefore suggest that if urban environments are instilled with green spaces or green spaces with animals, this could help to induce restorative effects and hence reinforce the harmonious relationship between man and nature.

Nevertheless, despite being in the hypothesised direction, the results discussed earlier are not statistically significant. These findings depart for what is expected, but they are similar to that obtained in the study by Falk et al. (2007) in which only 4% out of the study's sample experienced restorative effects. A number of reasons could explain these findings. First, it is likely that visitors who arrived at the zoo have specific identity-related motivations. These motivations can directly impact the way they conduct their visit and the meaning they derive from the experience (Falk et al., 2007). More specifically, visitors went to the zoo to have fun with families and friends, which, in turn, influenced how they answered the survey; and this motivation affects little on their stress levels and perceived restorativeness. Second, a recent study by Grahn and Stigsdotter (2010) found that the combined dimensions of 'Refuge' and 'Nature' (that is rich in species) and with a low or no presence of social interaction could be the most effective restorative environment for stressed individuals. This could explain why green spaces with animals but had a high amount of social interaction could not significantly lower stress levels of individuals.

The results also showed that the stress levels for female visitors are higher than males in both pre and post surveys. For the male visitors, their perceived stress decreased after exiting the zoo, however, the experience of stress among female visitors increased immensely. A proportion of the female visitors who participated in this study were mothers, therefore it is likely that their roles as guardians and caretakers of the family contribute to the high levels of stress and minimal reduction of stress after visiting the zoo. It is also possible that the characteristics or temperaments of children they have contribute to stress levels of the parents. Studies have demonstrated that mothers with children who have a difficult temperament reported higher stress (McBride, Schoppe&Rane, 2002).With responsibilities of caring for the family and taking care children with various temperaments at the zoo, female visitors have to be constantly vigilant, cautious, occupied, and naturally experiencing signs of stress.

Taking all results together, the study suggests that most participants reported experiencing higher levels of restorative effects and lower levels of stress after they visited the zoo. These findings are generally supportive of the cognitive model of attention restoration. However, certain limitations of the study were noted. One of which relates to the language barrier experienced by the participants.This was because some of the participants found it difficult to answer the survey as the questionnaires were written in English. Future research should incorporate a back-translated version of the questionnaires so that

participants may comprehend the questions with ease, clarity, and confidence. Furthermore, the inconsistent results obtained in the current study could be attributed to the different participants involved in the pre and post surveys. To mitigate this issue, it is recommended that the same participants are recruited in both surveys in order to improve the reliability and interpretability of the results.

It is also vital that the zoo authorities focus on maintaining the restorative qualities of the place. More often than not, after the establishment of a zoo, its maintenance is poorly conducted and its animal inhabitants are relatively ignored. To reinforce the restorative effects onto the visitors, it is highly recommended that the relevant authorities see further investment in the maintenance of the core infrastructures and zoo resources. Finally, it is hoped that the community can partake its responsibility to enhance the restorative qualities of the zoo's environment by preserving the potential of the natural setting. This can provide the opportunity to rebuild the unity between man and nature.

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