

Acute effects of being outdoors on college students mood in Costa Rica

Efectos agudos de estar al aire libre sobre el estado de ánimo de estudiantes universitarios en Costa Rica

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Abstract

Objective: analyze the acute effect of being outdoors in the mood of a group of college students of Costa Rica. **Methods:** participants of this study were 50 college students (age 21.88 ± 4.11 years): 27 (age 21.33 ± 2.96 years) physical education students (PEG) and 23 (age 22.52 ± 5.14 years) health promotion students (HPG). The 44 items POMS Mood State Questionnaire version was used, restructured from the spanish version. Two assessments were performed immediately before and after a 35-minute being outdoor session, students were asked to be seated, open eyes and quiet. The participant were exposed to a natural grass environment surrounded by trees. **Results:** there were found significant differences in tension-anxiety, depression and fatigue. **Conclusions:** forest therapy does work for improving the mood state of college students.

Keywords: College student, welfare, health, forest, leisure.

Resumen

Objetivo: analizar el efecto agudo de estar al aire libre en el estado de ánimo de un grupo de estudiantes universitarios de Costa Rica. **Método:** en el estudio participaron 50 estudiantes universitarios (edad $21,88 \pm 4,11$ años): 27 (edad $21,33 \pm 2,96$ años) estudiantes de Educación Física (PEG) y 23 (edad $22,52 \pm 5,14$ años) estudiantes de Promoción de la Salud (HPG). Se utilizó el Cuestionario de Estados de Ánimo de POMS de 44 ítems, reestructurándolo a

partir de la versión en español. Se realizaron dos evaluaciones inmediatamente antes y después de una sesión de estar al aire libre de 35 minutos, tiempo durante el cual se solicitó a los estudiantes sentarse, abrir los ojos y mantener silencio. Los participantes estuvieron expuestos a un entorno de césped natural rodeado de árboles. **Resultados:** se encontraron diferencias significativas en las variables de tensión-ansiedad, depresión y fatiga. **Conclusión:** la terapia forestal funciona para mejorar el estado de ánimo de los estudiantes universitarios.

Palabras claves: estudiante universitario, bienestar, salud, bosque, ocio.

Introduction

From the beginning, human being has been related to the natural environment to carry out activities such as hunting, housing construction and obtaining food through agriculture (Ulrich et al., 1991; Méndez, 2013), connections that day by day are markedly reduced. The current society is immersed in a series of processes that are related to the change and modification of some lifestyles and customs of human beings. Some of these processes have to do with the digitalization of society, globalization, the change in the forms of communication and the high levels of urbanism (Mont et al., 2014; Vergragt et al., 2014).

This last element, has well defined particularities in relation to the health of human beings, the growth and expansion of urban areas, besides favoring the increase in the housing possibilities of many people, are related to high levels of sonic contamination (González & Fernández, 2014), visual pollution (Méndez, 2013), atmospheric pollution (Ballester, 2005), besides greatly reducing the possibilities of accessing outdoor spaces, which allow the human being to witness or relate to natural elements such as trees, plants, animals, among others (Baldi & García, 2005).

The involvement of the human being in outdoor activities, with the presence of natural elements have produced positive effects in various areas and dimensions according to different studies (Wilson et al., 2016; Jahncke et al., 2015). In order to show the possible benefits for the human being, some interventions have been carried out through different modalities of outdoor activities, for example by visiting places surrounded by natural elements (Joye et al., 2010; Brengman et al., 2012), with the realization of walks in the middle of trails (Morita et al., 2007; Li, 2010), with the performance of some outdoor sports, with the permanence in the outdoors for a certain period of time (Tsunetsugu et al., 2010; Park et al., 2009), or with the simple fact of seeing a natural landscape (Velarde et al., 2007; Hansmann et al., 2007).

Being or staying in the natural environment, passively, without performing any activity that involves movement or significant caloric expenditure, is an activity that is gradually known and spreading in various areas of the planet, under the name of therapy in the forest (ForestTherapy) or forest bath (forestbathing) (Tsunetsugu et al., 2009). These activities are developed based on the positive effects produced by natural environments in humans, either

physiological or psychological and emotional, based on some theoretical constructs such as the concept of biophilia (Cramer & Browning, 2008), the theory of Attention Restoration (Kaplan & Kaplan, 1989) and the theory of Stress Reduction (Ulrich et al., 1991; Ballester & Asensio, 2005; Carpi et al., 2007).

On an emotional level, outdoor activities have produced positive results in several investigations, mainly in the reduction of cortisol (Park et al., 2007; Tyrväinen et al., 2014) which is known as the stress hormone, the same it is secreted by the adrenal gland in situations of stress (Seplaki et al., 2004), likewise there have been positive changes in variables such as vigor, tension, confusion, fatigue, anxiety and depression (Pretty et al., 2005; Takayama et al., 2014; Tyrväinen et al., 2014; Ochiai et al., 2015) demonstrating the importance of promoting spaces related to physical or "living" activities in environments surrounded by nature.

For all the above aspects, it is proposed to know the acute effect of forest therapy on college student's mood state.

Method

Participants

Participants of this study were 50 college students (age 21.88 ± 4.11 years): 27 (age 21.33 ± 2.96 years) physical education students (PEG) and 23 (age 22.52 ± 5.14 years) health promotion students (HPG). The participants are healthy and usually assist to 8 hours per day per 17 weeks period, the classes are 1/3 theoretical and 2/3 practical.

Ethical statement

All participants provided written consent after being informed about the research process. The research protocol followed the principles of the Declaration of Helsinki regarding biomedical research involving human subjects (18th Medical Assembly, 1964; revised 2013 in Fortaleza).

Instruments

The 44 items POMS Mood State Questionnaire was used (Andrade et al., 2010), restructured from the Spanish version made by Andrade et al. (2002, p.710). The questionnaire consisted in 44 items divided in 5 categories. The internal consistency values for the categories made by Andrade et al. (2010), are the follow: $\alpha = .92$ for Anger factor (11 items), $\alpha = .89$ for Fatigue (6 items), $\alpha = .84$ for Vigour (5 items), $\alpha = .77$ for Friendliness (6 items), $\alpha = .87$ for Tension (7 items) and $\alpha = .89$ for Depression (9 items).

Procedure

Two assessments were performed immediately before and immediately after a 35-minute being outdoor (see figure 1.), where students were asked to be seated and quiet. Participants were exposed to a natural grass environment surrounded by trees, it was performed between 9:00am, an average of 27.5°C, 0cm precipitation and 1150 m.a.s.l. in Heredia, Costa Rica.

The questionnaire was applied in groups but made individually. A single researcher was responsible to apply and explain the questionnaire by a standard protocol. The confidentiality of the individual responses was ensured before start. Participants were asked, for each item, to answer the following expression: “How you have been feeling during the past week, including today” (Andrade et al., 2002).

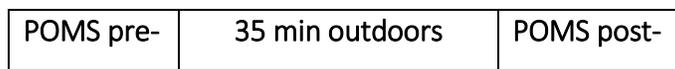


Figure 1. Schematized representation of study design.

Statistical Analysis

Results are expressed as means \pm standard deviation (SD). The coefficient of reliability of the POMS test was confirm for pre- and post- by the Cronbach's alpha. The qualitative interpretation of α -Cronbach was as follow: .25-.49, *low*; .5-.74, *regular*; .75-.89, *acceptable*; >.9, *high* (Hernández et al., 2010). Data were tested for normal distribution using the Kolmogorov-Smirnoff test, non-parametrical analysis was chosen. Wilcoxon rank-sum test was used to analyse the changes between pre-and post- POMS, results reported in Z-score. To compare the pre-post POMS test results between group the non-parametric U-Mann Witney test was used. All statistics were performed using the SPSS-v21 statistical package (SPSS Inc., Chicago, IL, USA), and with an alpha significance of .01.

Results

Table 1 Shows the reliability test for scale and sub scales of pre- and post- measures.

Table 1. Reliability Coefficient for pre and post test Total Scale and Subscales.

POMS Test	α -Cronbach
Pre-	.88 acceptable
Tension	.74 <i>regular</i>
Anger	.91 <i>high</i>
Depression	.73 <i>regular</i>
Fatigue	.85 <i>acceptable</i>
Vigour	.84 <i>acceptable</i>
Friendliness	.79 <i>acceptable</i>
Post-	.77 acceptable
Tension	.82 <i>acceptable</i>
Anger	.13 <i>low</i>
Depression	.42 <i>low</i>
Fatigue	.79 <i>acceptable</i>
Vigour	.8 <i>acceptable</i>
Friendship	.79 <i>acceptable</i>

Most pre and post-test categories have a coefficient of reliability rated as *acceptable*, ranging from .77-.88, the tension category in pre- was rated as *high* with .91 and three categories below *acceptable* standard lower than .74.

Table 2 shows there's Pre-Post significant differences in POMS Test factors: tension, anger, depression and fatigue.

Table 2. Pre-Post Differences in POMS Test.

Category	Evaluation	Average (n= 50)	Z (p valor)
Tension	Pre	5.5±4.4	-5.873 (.000)*
	Post	1.4±3	
Anger	Pre	3.3±5.6.	-4.086 (.000)*
	Post	.4±.9	
Depression	Pre	2.9±3.5	-3.038 (.002)*
	Post	1.5±2.1	
Fatigue	Pre	3.8±3.8	-4.51 (.000)*

	Post	1.6±2.4	
Vigour	Pre	13.8±3.8	-.02(.984)
	Post	13.7±	
Friendship	Pre	18.1±3.4	-1.409 (.159)
	Post	18.6±4	

*p value<.01

Table 3 shows the comparison in POMS results by sex. Sex based significant difference was reported in Anger post-, women had lower Anger reported.

Table 3. Sex based comparison by POMS test factor.

Category	Measurement	Men (n=30)	Women (n=20)	U-Mann Withney (p value)
Tension	Pre	6.4 ± 4.9	4.2 ± 3.2	223 (.125)
	Post	2 ± 3.8	.5 ± .8	229 (.126)
Anger	Pre	3.6 ± 5.6	2.7 ±5.8	255 (.349)
	Post	.7 ± 1.1	.1 ± .2	201.5 (.009)*
Depression	Pre	3.5 ± 4.1	2 ± 2	256.5 (.381)
	Post	1.7 ± 2.3	1.3 ± 1.8	272.5 (.562)
Fatigue	Pre	4.1 ± 3.9	3.4 ± 3.6	474.5 (.478)
	Post	1.5 ± 2.3	1.7 ± 2.7	311 (.814)
Vigour	Pre	14.1 ± 3.7	13.5 ± 3.9	273.5 (.598)
	Post	13.8 ± 4.3	13.6± 3.7	294 (.905)
Friendship	Pre	18.2 ± 3.8	18.1 ± 2.9	285 (.765)
	Post	18.8 ± 4.1	18.4 ± 3.8	284.5 (.758)

*p value<.05

Discussion

In the present study, important findings were found in the line of benefits that occur in different emotional variables in a group of university students after being in contact with the natural environment.

The findings in the variables evaluated by the questionnaire (Andrade et al., 2010), show significant reductions in the pretest and posttest values in the dimensions of Tension-Anxiety, Depression and Fatigue (Table 2). As well as an increase (although not significant) in the score of the friendship variable.

The results found indicate the possible benefits of being exposed to an environment surrounded by nature and agree with other studies that show positive changes in Tension-Anxiety, Depression and Fatigue (Horiuchi et al., 2014; Takayama et al., 2014; Tyrväinen et al., 2014; Ochiai et al., 2015), in these studies the time that predominates in the natural environment is 15 minutes.

One of the theories that explains the benefits at a psychological level that occur when being in natural environments is the Theory of Attention (Kaplan & Kaplan, 1989), in which natural environments foster a "fascination" (Kaplan, 1995) which produces a blockage of negative thoughts and emotions and are replaced by others of a positive nature (Zuckerman, 1977; Parsons, 1991).

The exhaustion of attention, known as attentional mental fatigue, manifests itself in irritability, impatience, intolerance among others, which greatly affect the mood in a negative way (Berman et al., 2008; Kjellgren & Buhrkall, 2010).

Likewise, findings in the physiological level that directly affect the emotional area have been found in different studies, where natural environments reduce the activation of the Amigdala (Kimbrell et al., 1999; Gwang et al., 2010) which it is related to impulsivity, anxiety and increased stress, as well as different variables related to the parasympathetic nervous system: reduction in cortisol values (Kirschbaum & Hellhammer, 1994; Park et al., 2007), heart rate (Park et al., 2007), blood pressure (Tsunetsugu et al., 2010; Lee et al., 2014), activity of the prefrontal cortex (Park et al., 2007; Bratman et al., 2015).

The present study offers evidence in relation to the emotional benefits that are produced by being in an environment surrounded by nature. It is necessary for future research the incorporation of a control group, as well as the permanence in different environments in order to evidence more clearly the effects of some and others.

Conclusions

The scientific evidence is clear about the benefits obtained by doing activities in environments that involve contact with nature; these benefits for the human being are related to the improvement of health components, as physical, emotional and social components.

As a complement to this knowledge of the benefits of outdoor activities for the human being, it is important to promote the incorporation of these activities to the different education levels, from elementary to higher education, with the propose of familiarizing students with these healthy practices, always guaranteeing the safety of people.

Efforts to investigate the benefits of this practice of activities for the human being must continue and specialize to expand other modalities of activities, as well as to quantify the effect on other variables related to the health of human beings.

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