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The Relationship Between Classroom Indoor Plants and Happiness of Female High School Students

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Abstract

Background: Nature relatedness and indoor plants can affect human mental health and behavior. In addition, students may take advantage of the green plant at schools.
Objectives: This study investigated the effect of indoor plants on the happiness of female high school students in the classrooms.
Methods: 384 students participated in this quasi-experimental study carried out with a pretest-posttest design and a control group. The subjects of this study were selected from among all female high school students studying in the 2016 - 2017 academic year. To randomize the students, a random allocation rule was used and the subjects were divided into intervention and control groups, each including six classes (n = 192). A demographic questionnaire and the Oxford Happiness Inventory (OHI) scale were answered by each group as a pretest. Living pot-plants were placed in the experimental group classrooms for 12 weeks and then the OHI was completed by the two groups as a posttest. Paired *t*-test was used to analyze the data.
Results: The results demonstrated that there was no significant difference in the mean happiness score between the intervention and control groups before the intervention. However, the mean happiness score increased from 41.17 to 55.58 after the intervention. In the posttest, the happiness score was significantly higher in the intervention group than in the control group ($P < 0.001$).
Conclusions: The presence of indoor plants in the classroom could be helpful in enhancing the happiness of female high school students.

Keywords: Happiness, Indoor Plants, Oxford Happiness Inventory (OHI), Nature, Students, Classroom, School

1. Background

Happiness is one of the most important human emotions that directly affect mental health (1). Over the past several decades, the science of happiness has been developed and found many factors that lead to a positive state. Happiness is more than the sense of human welfare (2).

The feeling of happiness is very important among students because it could affect their future. Over the last several years, school administrators, architects, teachers, and planners have tried to create happy schools and classrooms. Happy classes make happy students (3). It is well documented that physical characteristics of the environment like thermal comfort, color, light, and noise affect mental health and well-being (4, 5). The built environment in which we are located can affect mental health (6, 7).

One of the most influential environmental factors affecting mental health is a relationship with nature. The hypothesis of biophilia states that mental health is associated with people's relationship with nature (8, 9). In fact, although the permanent contact with nature is not possible, it can be maintained by the use of indoor plants to some extent (10, 11).

Plants were brought indoors by Egyptians in the third century BC and they were used more than 2000 years ago (12). Given the importance of the benefits that an indoor plant has for humans, it is used extensively in various spaces today. Actually, people do not bring plants indoors because they are eyeful, but because they are with potential psychological benefits.

Many studies reported that interior plants provide numerous benefits for wellbeing and health but a few studies have investigated this subject in classrooms. Fjeld (13) stated that indoor plants reduced sickness in primary students. Behavior and class marks were improved in the presence of green plants as Han (14) reported in a study. In addition, Doxey et al. (15) investigated the relationship between students' performance and indoor plants. According to their report, student's grades did not change significantly in the presence of plants in the classroom but students satisfaction rating improved in the presence of green plants.

In addition, a number of studies have examined the effect of viewing natural environment on mental health and academic achievements. Benfield et al. (16) found that the natural view of classrooms affected students grades. The study of Li and Sullivan (17) was done to investigate the effect of window views to green landscapes on student's mental fatigue. According to the results, the classroom views to green landscape increased student's recovery from stressful experiences. Given the great benefits of students contact with nature and plants, designing a space for indoor plants in the classroom will be useful in educational buildings like schools (18).

2. Objectives

Despite the importance of happiness in the classroom climate, limited research has been done on the environmental factors that increase happiness like the connection with indoor plants. Therefore, the aim of this study was to investigate the effect of indoor plants on the happiness of female high school students in classrooms.

3. Methods

3.1. Study Design and Sample

This study was a quasi-experimental research conducted with a pre-posttest design and a control group. The study population included all female high school students studying in Shiraz in the 2016 - 2017 school year. 12 classrooms in four schools were selected randomly all being at the 10th grade to limit the intervening variables. In general, schools in Shiraz are divided into four districts, and one high school was selected from each district randomly. The random allocation rule was used to randomize the students into intervention and control groups (n = 192). The inclusion criteria included no history of mental illness and depression in the physical health records of students available at the school. The study was single-blind and students were unaware of the aim of plant's presence in the classroom.

The intervention was done by placing four pothos (Epipremnum Aureum) pot-plants in the four corners of the classroom for 12 weeks in the classrooms of the experimental group. The height of the table that pot-plants located on was 80 cm. Data were analyzed using SPSS 21 software. Paired *t*-test was used to analyze the data. Before the beginning of the research, written informed consent was obtained from the parents of the students to participate in this study.

3.2. Instrument

Two data collection tools were used in the present study. The demographic questionnaire included personal details such as age and the OHI was used to evaluate happiness. The OHI includes five domains: life satisfaction, self-esteem, subjective well-being, satisfaction, and positive mood. The questionnaire included 29 items, each of which including four choices. The first choice was scored as zero and the fourth choice was scored as three. The participants could obtain a score between 0 and 87 in total. Scores below 22, 22 to 44, 44 to 68, and 68 to 87 were indicative of low, average, high, and very high happiness levels, respectively. The reliability and validity of the questionnaire were approved by Alipour and Agah Heris (19). The OHI was completed by the two groups at the pretest and posttest in order to investigate the effect of indoor plants on the happiness of female high school students in the classrooms.

4. Results

384 students participated in this study (192 in the intervention group and 192 in the control group). The mean age of the students was 15.4 $\pm$ 1.13 in the intervention group and 15.7 $\pm$ 1.19 in the control group. The mean family monthly income was between 25 - 30 million Rials for both intervention and control groups. Therefore, no significant difference was observed between the two groups in term of age and family income and the two groups were homogeneous. No history of allergy to the plants was reported in the two groups.

The mean happiness score in the intervention group was 41.17 $\pm$ 12.40 at pretest and 55.58 $\pm$ 16.38 at posttest ($P < 0.001$). In addition, in the control group, the happiness score was 39.50 $\pm$ 8.22 at pretest and 41.17 $\pm$ 12.40 at posttest ($P = 0.129$). Table 1 indicates the mean and standard deviation (SD) of the student's happiness score at pre and posttest in the two groups.

Table 1. Parid Sample *t*-Test

Pre-Posttest	Mean $\pm$ SD	*t*	P Value
Intervention group		10.7	< 0.001
Pretest	41.17 $\pm$ 12.40		
Posttest	55.58 $\pm$ 16.38		
Control group		1.52	0.129
Pretest	39.50 $\pm$ 8.22		
Posttest	41.17 $\pm$ 12.40		

5. Discussion

Happiness is a major need, especially for students at schools. For this reason, the aim of the present study was to investigate the effect of indoor plants on the happiness of female high school students. The results showed that indoor plants increased the happiness of female high school students.

Epipremnum Aureum was used as the indoor plant in this study, which belongs to the Araceae family and contains more than 100 genera. It is one of the best plants used for purifying air pollution. Torpy et al. (20) reported that indoor plants like Epipremnum Aureum could improve the indoor air quality and reduce air pollution. The present study reported one of the other benefits of this plant: the increased happiness of the students, which may also be associated with cleaner air. In addition, the plants' features such as size, color, and odor could affect the comfort of humans as evaluated by Qin et al. (21).

According to Zelenski and Nisbet (22), the nature connection could provide a way for increasing human happiness. The theories of Ulrich (23) and Kaplan and Kaplan (24) extend the positive effects of nature on human emotion. The result of this study supports the psychological benefits of indoor plants emerged as increased as happiness, which confirms the results of the present study.

However, connection with nature is not possible for all residents of different geographical areas. In many geographical areas, the lack of plants and green spaces has deprived students of the benefits that one of their most influential is happiness. One way to take advantage of the benefits of connecting with nature is to use indoor plants in the classroom (14). Many studies have proven the positive effects of outdoor education and connection with nature (25, 26). Green landscape is one of the environmental factors affecting student mental health in educational buildings (6). Li and Sullivan (17) reported that students' views to green landscapes in the classroom have significant impacts on mental health like recovery from stress. The results of this study were in line with the research results of Burton et al. (27), which studied the effect of green spaces on wellbeing and happiness in residential buildings.

Given the classroom interior design, there was no proper place for the green plant to be located in the classroom. This limitation will prevent all students to benefit from indoor plants. It is recommended that this placement be considered in the interior design.

5.1. Conclusions

This research supports the idea that the existence of indoor plants in the classroom can increase female student's happiness though further research is suggested for male students and other educational levels. These findings can provide a guide to school administrators, architects, teachers, planners, and policymakers who are interested in creating happier schools.

Footnote

Ethical Considerations: Written informed consent was obtained from the parents of the students to participate in this study.

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