

Impact of Hydroponic-Planting Service Program on Green Space Participation, Happiness and Stress among Hong Kong Chinese Adolescents

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1. ABSTRACT AND KEYWORDS

Abundant literature showed that exposure to nature, or green space, can have beneficial effects on mental health. Studies of the impact of green space program in mental health among Chinese adolescents are very limited. This service project aims to study the impact of a pilot program on green exposure, green activity, green satisfaction, stress and happiness among adolescents in secondary schools. The quasi-experimental design with control group was adopted. The intervention program focused on the hydroponic planting; group practice in the hydroponic planting at school, green eating, green tasting and relaxation exercise. The control group consisted of the usual stress management program of learning stress coping, sharing leisure activities and relaxation exercise in classes. Three secondary schools were recruited. Each school involved two classes in grade 7 and 8. Females displayed significantly higher overall green exposure level than males. The green space program introduced impacts on the levels of exposure, activity, satisfaction, stress and happiness in green participation one month after the program. The long term effect of integrating the Hydroponic planting techniques in promoting green space and mental health among Hong Kong Chinese adolescents worth further investigation.

Keywords: Green-space; Hydroponic-planting; Happiness; stress; Chinese adolescents

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2. INTRODUCTION

Previous studies on green space programs in mental health focused mostly on adults. Its impacts on Chinese adolescents are very limited. In Hong Kong, school adolescents are often under inter-personal pressure in forming new social relationships and academic performance (Perry & Pauletti, 2011). Due to increasing urbanization and densification in Hong Kong, most students live far away from green nature. The impact of green school programs on stress and greenness participation remain unknown. This project aims to study the impact of a pilot green space program on green exposure, green activity, green satisfaction, stress and happiness among adolescents in secondary schools. Specifically, we investigated whether there were differences of these outcomes at baseline and one-month post-intervention. Gender differences of the above-mentioned outcomes were also examined. Implications to the service design will be discussed.

3. THEORETICAL FRAMEWORK

Abundant literature showed that exposure to nature, or green space, can have beneficial effects on mental health. For example, adolescents who were in contact with green space could help establish a more relaxing lifestyle and improve their mental health (Feda, Seelbinder, Baek, Raja, Yin, & Roemmich, 2015). A study by Hui (2006) found that visual or physical contact with the green space could improve both mental and psychological well-being. Other studies showed that more physical activities and visits to green space could positively impact on the mental health and reduce stress levels of young people (Janssen & Rosu, 2015). Previous studies showed that there were gender differences in attitudes towards green space; females displayed greater enjoyment towards both green environment and planting activities than males and the impact of green space on males and females displayed substantial variations (Sang, Knez, Gunnarsson, & Hedblom 2016). Earlier studies investigated the effects of green space program holistically but the specific effects remain unexplored. There was also a lack of local research on the relationships between green space and gender differences on mental health in secondary schools.

4. METHOD AND ANALYSIS

The quasi-experimental design with control group was adopted. The Green Space Program consisted of six one-hour sessions which were conducted in three months service program. The intervention program focused on the hydroponic planting; group practice in the hydroponic planting at school, green eating, green tasting and relaxation exercise. The control group consisted of the usual stress management program of learning stress coping, sharing leisure activities and relaxation exercise in classes. Both the control and intervention programs were conducted by the trained faculty students under a service learning course in collaborative care in school health and safety offered by a university institution in Hong Kong.

Convenience sampling was used to recruit participants in both groups within a mainstream school in Hong Kong. Three secondary schools were recruited. Each school involved two classes in grade 7 and 8. The classes were randomly assigned to control and intervention groups. The self-developed questionnaire on green exposure, green activity, green satisfaction and adopted DASS-stress subscale and happiness- face scale (Ian McDowell, 2006) were distributed to the school students in both groups at baseline and one-month post-intervention. Inclusion criteria would be being able to read Chinese, communicate in Cantonese and no experience in hydroponic planting.

Questionnaires at baseline and one-month post-intervention were matched to students using the class and class number of students. Demographic characteristics were summarized with descriptive statistics and compared using Chi-squared tests. The outcome variables were checked for normality using the Kolmogorov-Smirnov test. As non-normality was found, Mann-Whitney U tests were used to test for statistically significant differences between intervention and control groups. Similarly, Mann-Whitney U tests were also conducted between males and females. All statistical analyses were performed using IBM SPSS version 25. Statistical significance was assessed at 0.05 level.

5. RESULT AND DISCUSSION

Sample characteristics

At baseline, 59 students were recruited, 18 students and 41 students joined the intervention and control groups respectively. No student dropped out from the intervention group and 4 students dropped out from the control group. Thus, the final sample size was 55 students, with 18 and 37 students in intervention group and control group respectively.

Sixty percent of the participants were male and eighty percent of them was between 13 and 14 years old. Slightly more than half (58.2%) was at grade 8. There were significantly more grade 7 students in the intervention group than the control group (61.1% vs. 32.4%, $\chi^2=4.29$, p-value=0.045). Majority of the participants (61.8%) lived in public housing. Over three-quarters (76.4%) of them received not more than HK\$100 (approximately US\$12.8) pocket money per week. There were significantly more students receiving not more than HK\$100 pocket money in the intervention group than the control group (94.4% vs. 67.6%, $\chi^2=4.85$, p-value=0.028). Majority (67.3%) of the students lived with both parents and more than half (60%) lived with siblings.

Exposure Level

The intervention group had a significant higher green exposure level than the control group. The significance was related to the increase of the frequency of accessing green community facilities and participation of planting in school. There was a greater impact on green exposure levels on females than males.

Activity level

The overall mean score for activity level between the intervention and control groups at one-month post intervention was not statistically significant (2.82 vs. 2.72, p -value=0.47); though the overall activity score was slightly higher in the intervention group than the control group. The intervention group showed a higher confidence in planting techniques, a stronger agreement towards the beliefs of “green planting increases concentration”, and that “group planting helps promote communication”.

These results may imply that the program may positively increase the students’ participation in green activity.

Satisfaction level

The overall satisfaction level showed no difference between the intervention and control groups at one-month post-intervention. Students in the intervention group were more satisfied with the green environment at school and green community facilities than in the control group.

Happiness and Stress level

The intervention group had a higher happiness score than the control group. Both the control group and the intervention group had a reduction in the stress score after the program. The control group felt more relaxed when using the green facilities or viewing the plants. These results could be due to the effect of peer pressure to perform better than their classmates (Simuforosa, 2013) during the group planting activity that may result in these feelings.

Consistent with earlier literature (Astell-Burt, Mitchell, Hartig, 2014; Richardson & Mitchell, 2010), there were gender differences in the outcomes at both baseline and one-month post-intervention. At baseline, females in the intervention group showed a higher satisfaction level. Females showed a higher exposure level to green space in the control group and in the intervention group. Males reported slightly lower stress level when compared to females in the intervention group. The gender differences in these outcomes are in line with previous evidence, which suggests males and females respond to the green space program differently (Beil & Hanes 2013). Further exploration of the mechanism behind is needed when designing the service activities for the male and female students.

6. CONCLUSION

In conclusion, females displayed significantly higher overall green exposure level than males. The green space program introduced impacts on the levels of exposure, activity, satisfaction, stress and happiness in green participation in one month after the program. The long term effect of integrating the hydroponic planting techniques in promoting green space and mental health among Hong Kong Chinese adolescents in schools worth further investigation.

REFERENCES AND CITATIONS

- Astell-Burt T, Mitchell R, Hartig T. (2014) The association between green space and mental health varies across the lifecourse. A longitudinal study. *J Epidemiol Community Health*. 68(6), 578-83.
- Beil K, Hanes D.(2013) The influence of urban natural and built environments on physiological and psychological measures of stress--a pilot study. *Int J Environ Res Public Health*. 10(4), 1250-67.
- Feda, D. M., Seelbinder, A., Baek, S., Raja, S., Yin, L., & Roemmich, J. N. (2015) Neighbourhood parks and reduction in stress among adolescents: results from Buffalo, New York. *Indoor Built Environ*, 24(5), 631-639.
- Hui, D.(2006) Benefits and potential applications of green roof systems in Hong Kong. The 2nd Megacities International Conference, 1-2 December, Guangzhou, China.
- Ian McDowell.(2006) *Measuring health: A Guide to Rating Scales and Questionnaires*, Oxford University Press. Oxford.
- Janssen, I., & Rosu, A. (2015) Undeveloped green space and free-time physical activity in 11 to 13-year-old children. *Int J Behav Nutr Phys Act*, 12 (1), 26.
- Perry, D. G. and Pauletti, R. E. Gender and Adolescent Development. (2011) *J Res Adolesc*, 21: 61-74. doi:10.1111/j.1532-7795.2010.00715.x
- Richardson E.A., Mitchell R.(2010) Gender differences in relationships between urban green space and health in the United Kingdom. *Soc. Sci. Med.*,71, 568–575.
- Sang, Å. O., Knez, I., Gunnarsson, B., & Hedblom, M. (2016) The effects of naturalness, gender, and age on how urban green space is perceived and used. *Urban Forestry & Urban Greening*, 18, 268-276.
- Simuforosa, M.(2013) Stress and adolescent development. *Journal of Education Research*, 3(8), 373-380.