

Effects of Trail Information on Physical Activity Enjoyment

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Introduction

Physical Activity

Moderate physical activity (PA) improves physical fitness measures (i.e., aerobic capacity, agility, flexibility, body composition, and muscular endurance and strength). In addition to numerous physiological benefits, PA has been shown to increase cognitive and emotional functioning. These benefits lead to improved immune response and have been associated with increases in health and quality of life. PA has also been linked with reduced risk in cardiovascular disease, type-2 diabetes, numerous chronic diseases, and all-cause mortality. These findings are well established (US Department of Health and Human Services, 1996).

The health benefits of PA are supported by numerous organizations and agencies. In determining the amount of PA needed to obtain the above mentioned benefits, the American College of Sports Medicine (ACSM) and the Centers for Disease Control and Prevention (CDC) have recommended that every American adult engage in 30 minutes of moderate PA, five or more days a week. Moderate PA is equivalent to activities utilizing large muscle groups and is equivalent to brisk walking. Other examples of moderate PA include swimming, cycling, and gardening.

Despite widespread evidence, awareness, and importance of PA on health and quality of life, more than 60% of Americans do not engage in recommended levels of PA. In an attempt to resolve this potential epidemic, the 1996 Surgeon General's report on PA and health outlined the seriousness of inactivity on health, and provided guidelines for promoting PA in America. Initiatives have been developed by CDC, National Institutes of Health (NIH), other agencies under the United States Department of Health and Human Services (HHS), and the National Recreation and Park Association (NRPA) to focus on the issue of PA and health.

The conceptual basis and literature review has primarily focused on the psychosocial and behavioral variables that may be associated with promoting or impeding PA and has been a major influence in the above-mentioned initiatives and interventions. Psychological factors such as arousal regulation and enjoyment have been identified as strong determinants to beginning and adhering to a PA program. Specifically, enjoyment has consistently emerged as the strongest predictor for adolescents' commitment to continue PA.

Enjoyment

Providing enjoyable experiences is critical for increasing PA levels in youth, their attitude about the value of PA, and ultimately long-term health outcomes (Rowland & Freedson, 1994). Wankel (1985, 1993) stated that enjoyment was an underlying factor in committing and adhering to PA.

Csikszentmihalyi (1975) defined enjoyment as differing from pleasure. He explained that pleasure focused on sensory stimulation with little to no processing of information. For example, watching television is primarily a sensory (pleasurable) activity. Although there may be some processing of information, the process is a passive absorption of information and does not require an individual to fully concentrate her attention on the activity. Enjoyment, on the other hand, is characterized by a sense of accomplishment. Enjoyment may be reading a book that provides new insight of an idea or a conversation that leads you to question your belief system.

In a physical activity example, walking on a trail with no investment in psychic energy is pleasurable, but not enjoyable. According to Csikszentmihalyi (1990), walking would become enjoyable if an individual uses his attention on focusing on the surroundings or stretches his abilities (i.e., walking faster or further than thought possible).

Correlational research found that models focusing on person centered (inter- and intra-individual) interventions explained between 20-40% of the variance in PA (Spence & Lee, 2003). Due to the modest efficacy of recent inter-/intra-individual models, research has suggested that a more expansive, ecological based model be developed and implemented to determine other variables that may directly and/or indirectly effect PA.

Several ecological models have been proposed in the context of explaining PA. Spence and Lee (2003) have proposed an ecological model of PA based on a modified structural model of environmental influences on behavior. The

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researchers proposed that the environment (extra-individual) has both direct and indirect effects on PA. In addition, the model hypothesized that psychological factors mediate most of the relationship between extra-individual factors and PA.

King, Castro, Wilcox, Eyler, Sallis, and Brownson (2000) used an ecological model to assess the personal and environmental factors associated with physical inactivity among women. The researchers found that environmental factors (lack of hills and absence of scenery) were significantly associated with PA. In using an ecological model, extra-individual variables are examined in addition to inter- and intra-individual variables, and both direct and indirect effects of the environment on PA can be examined.

Trail Information

Studies have demonstrated the benefits of supportive environments in increasing and sustaining people's involvement in PA. For example, the effects of posting a sign to encourage the use of stairs rather than an escalator found that stair use doubled from baseline measurements when the sign was posted and decreased when the sign was removed.

Although research exists in the area of signs in deterring negative behaviors and increasing knowledge and attitudes regarding environmental policies and management practices, an extensive literature review produced no empirical studies investigating the link between sign information on walking trails and PA.

Therefore, the purpose of this study is to use an ecological model and determine if environmental variables have an effect on psychological variables. Specifically, this research will test the hypothesis that students exposed to exercise information on a walking trail will score significantly higher on the Physical Activity Enjoyment Scale (PACES) and will adhere significantly longer to a walking program than students in a no and no-stop information groups. In addition, two types of information (exercise and historical) were explored to determine if a difference exists in PA enjoyment and adherence.

Methods

Research Participants

Research participants consisted of college students (N = 400) enrolled in a general education course. The general education course was a leisure and lifestyle class and data were collected during four consecutive semesters; Fall1 (n = 99), Spring1 (n = 96), Fall2 (n = 110), and Spring2 (n = 95). Students represented the University demographics in terms of age, gender, race, and ethnicity. Students were informed that the purpose of the study was to examine variables associated with physical activity. All participants were assured of confidentiality and anonymity of results, and signed an informed consent document.

Each semester, students enrolled in the general education course were randomly assigned to one of four groups; a no information group; a no-stop information group; an historical information group; and an exercise information group (see Table 1). Between two to five students each semester were absent on the day of data collection and were not counted as research participants in the analysis.

Table 1 - Number of students in each group per semester (N = 400)

Group	Fall1 (n = 99)	Spring1 (n = 96)	Fall2 (n = 110)	Spring2 (n = 95)
Exercise	26	25	30	22
Historical	24	26	27	28
No information	23	22	27	21
No-stop information	26	23	26	24

Instruments

The Physical Activity Enjoyment Scale (PACES) consists of 18 bipolar statements with each item presented in a 7-point semantic differential format. A total score is achieved by summing all 18 items with 11 items being placed in reverse order. The purpose of the PACES is to assess the extent to which an individual enjoys a physical activity regardless of motivation. Research participants rate their perception of a physical activity at the time of participation. An example of a bipolar item on the PACES included, "I feel bored" 1 2 3 4 5 6 7 "I feel interested."

The reliability of the PACES has demonstrated acceptable correlations between $r=.45$ to $r=.87$ and internal consistency coefficients of .90 to .96 as calculated by Cronbach's coefficient alpha (Crocker, Bourffard, and Gessaroli, 1995; Kendzierski and DeCarlo, 1991). Convergent evidence for construct validity was found to be acceptable in measuring the extent to which an individual enjoys participating in a physical activity.

A sign was used to convey information and increase the probability of research participants experiencing enjoyment during their walk. The sign consisted of a white, standard sized poster board and was centered at 65 inches on a tree nearest the trail every half mile. The sign information was written in three inch letters with a black marker. The content of the information consisted of a fact and a question with the answer appearing at the next sign located one half mile ahead of the previous sign. An example of a factoid presented to the exercise information group was, “3,500 calories equals a pound of fat.” An example of a question presented to the exercise information group was, “approximately how many calories are burned walking two miles?”

Procedure

Each of the four identified groups walked a distance of two miles along a paved trail. The walking trail consists of an asphalt surface and is used by both cyclists and pedestrians. The trail follows the American River adjacent to California State University, Sacramento. Each group walked at an approximately 18-minute mile pace with a 30 second stop every half mile except for the no-stop information group. During the 30 second stop, the two information groups read material regarding exercise or trail history and the no information group observed their watch for 30 seconds.

At the end of the 2-mile walk, participants in all four groups completed the PACES. Upon completion of the PACES, participants were provided material requesting all groups to continue a 2-mile walking program on the same trail, three days a week for 10 weeks and keep an attendance log. At the end of two weeks, a large focus group was conducted to provide additional information regarding sign information and walking.

Data Analysis

Data were collected using the PACES 18-item instrument and entered using SPSS 11.0 for windows. The independent variable was type of information (exercise, historical, no, and no-stop) with the dependent variable being physical activity enjoyment as measured by the PACES. A one-way analysis of variance (ANOVA) was conducted for each semester. A post hoc analysis was performed to determine which groups were significantly different. Due to the uneven number of participants in each group, harmonic means were used. An informal focus group was conducted at the end of the semester to determine adherence levels of the walking program and discuss other factors responsible for maintaining or discontinuing the walking program. Significance was set at an Alpha equal to .05.

Results

The results of the one-way ANOVA revealed significant differences between groups (see Table 2). A Lavene statistic was used to test for homogeneity of variance. In addition, both Welch and Brown-Forsythe statistics were used to determine the robustness of mean equality. Due to the significance of the above tests, a Dunnett's T3 post hoc analysis was conducted (see Table 3). The post hoc analysis showed a significant difference between the exercise group and the no information and no-stop information groups. There were no significant differences between the historical group and the no information groups. This finding was consistent in all four semesters. However, the exercise information group adhered to the walking program significantly longer than the other three information groups. In addition, participants in the exercise information group completed the 2-mile walk in a shorter time period than the historical, no-stop, and no information groups. Results from the focus group revealed that exercise information provided more goal oriented feedback and was more encouraging in sustaining the walking program than historical information. However, within one week of the study, the signs were either taken down or vandalized.

Table 2 - One-way ANOVA for each semester

Semester (between groups)	Sum of Squares	df	Mean Square	F
Fall1	9.03	3	3.10	*5.14
Spring1	8.96	3	2.99	*5.33
Fall2	7.06	3	2.35	*4.24
Spring2	8.45	3	2.82	*5.52

* p < .01.

Table 3 - Dunnett's T3 post hoc analysis for Exercise

Semester	Group	Mean Difference	Std. Error
Fall1	No Stop	*.65	.194
	Historical	.36	.148
	No Information	*.78	.236
Spring1	No Stop	*.55	.180
	Historical	.26	.158
	No Information	*.63	.213
Fall2	No Stop	** .72	.200
	Historical	.41	.162
	No Information	*.77	.222
Spring2	No Stop	*.64	.195
	Historical	.37	.144
	No Information	** .82	.228

* $p < .05$. ** $p < .01$.

Discussion

Results indicated that trail signage increased enjoyment and adherence to a walking program. The findings are limited to college students, but support Csikszentmihalyi's flow theory and Berlyne's Arousal theory. Although the sign, information format and content were consistent each semester, the sign was either taken down or vandalized after the initial 2-mile walk.

Future research will need to assess other population segments to expand the generalizability of the results. Similar trails with and without signage need to be examined to evaluate the potential strength of affecting PA in relation to other environmental factors (i.e., aesthetics, lighting, topography). Sign information will need to be assessed in terms of type, content, format, longevity, and spacing. Research exists supporting the design of signs, but not specifically related to promoting PA.

With a paucity of research existing in the area of trail signage, and the potential of that information to promote and sustain PA, further research is warranted. The PA benefits to the individual, community, and environment may outweigh the costs of implementing informational signs on walking trails.

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