Building the Evidence—U.S. Approaches

Assessing the Perceived Environment Among Minimally Active Adolescent Girls: Validity and Relations to Physical Activity Outcomes

Genevieve Fridlund Dunton, Margaret Schneider Jamner, Dan Michael Cooper

Abstract

Purpose. *This study examined how adolescents' perceptions of exercise resources in the environment relate to physical activity outcomes.*

Methods. *Perceptions of the availability and use of environmental resources, vigorous physical activity (VIG), daily energy expenditure (KCAL), lifestyle activities (LA), and cardiovascular fitness ($\dot{V}O_2$peak) were assessed cross-sectionally among 87 minimally active adolescent girls (ages 14–17). To validate adolescent reports, the perceived availability of environmental resources was also assessed from 47 parents.*

Results. *Adolescent-parent agreement over the availability of resources was modest for the home domain (*$r = .62$, $p < .001$*) and weak for the community domain (*$r = .14$, $p > .05$*). Adolescents' perceptions of resource availability in both the home and community domains were positively associated with $\dot{V}O_2$peak (*$p < .05$*) but unrelated to VIG, KCAL, and LA. Adolescents' use of home resources was positively correlated with both VIG and LA (*$p < .05$*).*

Conclusion. *Minimally active adolescent girls were more attuned to and likely to use the resources for physical activity located in their home environment as opposed to the community environment. (Am J Health Promot 2003;18[1]:70–73.)*

Key Words: Measurement, Cardiovascular Fitness, Community Design, Prevention Research

Genevieve Fridlund Dunton, MA, is with the Department of Psychology and Social Behavior at the University of California, Irvine. Margaret Schneider Jamner, PhD, and Dan Michael Cooper, MD, are with the Department of Pediatrics at the University of California, Irvine.

Send reprint requests to Genevieve Fridlund Dunton, 209 Social Ecology I, University of California, Irvine, Irvine, CA 92697-7080 (e-mail: gdunton@uci.edu).

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INTRODUCTION

Despite evidence linking physical activity to a number of health parameters, adolescents become increasingly sedentary throughout high school. Recent epidemiological data suggest that only 69% of 14-year-olds exercise vigorously on 3 or more days of the week, and this number drops to 49% of 18-year-olds.[1] Previous research has explored the association between perceived environmental factors and physical activity in young adults,[2] but this relationship has received relatively little attention in adolescents. The few available studies have focused on a limited number of environmental variables, often in a single domain (e.g., neighborhood). In addition, literature from related disciplines has questioned the validity of adolescent reports of physical environment characteristics.[3] The present study examined perceptions of exercise-related environments among minimally active adolescent girls, a population at risk for becoming sedentary and/or overweight adults. The goals were to (1) test the validity of environmental resource availability reported by minimally active adolescents through comparisons with parent reports, (2) examine the association between perceived availability and use of exercise-related environments and physical activity outcomes, and (3) determine the relative importance of the home vs. community domain for physical activity in this population.

METHODS

Design

Cross-sectional data were used for all analyses. Perceived availability and use of home and community environments was assessed through telephone and written surveys. Self-reported physical activity levels and lifestyle activities and objectively measured cardiovascular fitness were evaluated at a clinical research testing facility.

Sample

The study sample consisted of 87 adolescent girls, 14 to 17 years old (mean = 15.02 ± .72 years), recruited as part of a larger intervention study. Inclusion criteria were (1) failure to meet the minimum physical activity recommendations as set forth by the American College of Sports

Medicine/Centers for Disease Control and Prevention (ACSM/CDC),[4] (2) performance at or below the 75th percentile of cardiovascular fitness for their age, and (3) no health problems that prevented participation in physical activity. In total, 69% of adolescents originally expressing interest in the study met these criteria and were recruited (N = 87). The ethnic breakdown was 48% Caucasian, 27% Hispanic/Latino, 14% Asian, 1% African-American, and 10% Other/Mixed.

Due to practical limitations, parents of only 47 participants were enlisted to validate the adolescent reports. Adolescent participants whose parents were surveyed did not significantly differ on any of the environmental or physical activity variables from adolescents whose parents were not surveyed. All parent respondents lived in the same household as their daughter.

Measures

Perceived Environments Related to Physical Activity. Participants completed modified versions of the home and community scales of the Perceived Environments Related to Physical Activity instrument.[2] This questionnaire assessed perceived availability of home exercise items (e.g., treadmill, bicycle, trampoline, basketball hoop, and weights) and community exercise facilities (e.g., gym, public park, biking trails, dance studio, and basketball court). In order to customize the instrument to an adolescent sample, 16 additional home items were included (e.g., scooter, Frisbee; 25 total items), and six community facilities were added (e.g., skateboard park, miniature golf course; 26 total facilities). The community scale was altered to use a ''10-minute drive'' as a means of determining if a facility was located within a respondent's community. The modified instrument also assessed the variety and frequency of home items and community facilities used in the past 30 days. In a subsample of the study participants, the modified version of this instrument demonstrated a 3-month test-retest reliability of .73 for the perceived availability of home items and .69 for the perceived availability of community facilities.

Cardiovascular Fitness. Measurements of peak oxygen consumption in milliliters per minute per kilogram of body weight ($\dot{V}O_2$peak) were obtained through a ramp-type progressive exercise test on an electronically braked cycle ergometer. Using the SensorMedics Vmax 229 metabolic cart (Yorba Linda, California), measurements of $\dot{V}O_2$peak were obtained through a method previously designed for children and adolescents.[5]

Energy Expenditure. Physical activity level was measured using a 2-day physical activity recall (2DPAR) modeled after the previous 1-day PAR.[6] The 2DPAR provided a format for participants to record all of their activities for the previous 2 days between 7:00 A.M. and 11:00 P.M., segmented into 30-minute intervals. Using a predetermined list of activities, respondents chose the type of activity that best described each half hour. Activity types were converted into metabolic expenditure units (METs). For example, a half hour of sitting = 1.0 MET, and a half hour of vigorous running = 9.0 METs. Vigorous physical activity (VIG) was identified as greater than or equal to 6.0 METs. Average daily energy expenditure in kilocalories (KCAL) was calculated using the following formula: [METs $\times$ body weight (kg) $\times$ 30 min/60 min]/2 days.[7]

Lifestyle Activities. Unstructured aspects of lifestyle physical activity were assessed through the Stanford Usual Physical Activity Scale.[8] On a yes/no scale, participants indicated their usual participation in 6 lifestyle activities such as taking the stairs instead of the elevator and walking short distances instead of driving. Sufficient reliability and validity for this scale has been demonstrated elsewhere.[8]

Demographics. Participants provided information about age; ethnicity; average household income in their neighborhood (low, medium, medium high, or high); and length of community residency (in years) through written questionnaires.

Statistical Analyses

To normalize skewed distributions, square root transformations were applied to the variables representing the variety and frequency of environmental resources used.[9] VIG was dichotomized (some vs. none) because of the large percentage of the sample that engaged in no vigorous activity (67%). Missing data were handled through pairwise deletion. Pearson's and point-biserial correlations were used to assess agreement between parent and adolescent reports as well as correspondence between environmental variables and physical activity outcomes.

RESULTS

Descriptive Information

Means and standard deviations for demographic, environmental, and physical activity variables are summarized in Table 1. In general, participants used a greater percentage of available home items (37%) than community facilities (19%) in the past month. Neighborhood income was mildly positively associated with adolescents' perceptions of home and community environmental resource availability. In addition, respondents who had lived in the community longer perceived a greater number of exercise-related facilities in that area.

Adolescent-Parent Agreement

Parents and their children did not completely agree on the number of exercise items in their home (r = .62, $p < .001$), and the number of community facilities reported by adolescents was unrelated to the number reported by their parents (r = .14, $p > .05$).

Perceived Availability of Environmental Resources and Physical Activity

Both the number of home items and community facilities perceived by adolescents were positively associated with cardiovascular fitness ($\dot{V}O_2$peak; see Table 1). The perceived availability of resources at home and in the community did not significantly correlate with any of the behavioral

Table 1

Means, Standard Deviations, and Intercorrelations for Study Variables

Variable	1	2	3	4	5	6	7	8	9	10	11	12
1. Income†	—	0.003	0.227***	0.059	0.059	0.327**	−0.154	−0.166	−0.119	0.007	0.021	0.158
2. Community residency‡		—	0.064	0.020	−0.054	0.234***	0.091	0.054	0.065	0.240***	0.019	0.084
3. Home availability			—	0.419*	0.216***	0.252***	0.113	0.028	−0.062	−0.010	0.040	0.224***
4. Home use variety				—	0.667*	−0.013	0.382*	0.429*	0.340**	0.149	0.242***	−0.005
5. Home use frequency					—	−0.005	0.113	0.494*	0.276***	0.096	0.262***	0.049
6. Community availability						—	0.132	0.125	−0.132	−0.086	−0.043	0.266***
7. Community use variety							—	0.829*	0.073	0.035	0.156	0.101
8. Community use frequency								—	0.102	−0.051	0.144	0.067
9. Some vs. no vigorous activity (VIG)§									—	0.313***	0.187	−0.122
10. Energy expenditure (KCAL)‖										—	0.191	0.038
11. Lifestyle activities (LA)¶											—	0.052
12. Fitness ($\dot{V}O_2$peak)#												—
n	87	87	87	87	86	87	87	85	83	81	85	82
M	2.57	8.13	9.94	3.59	23.03	14.30	2.68	11.67	0.37	1748.97	2.15	23.96
SD	0.66	5.03	3.34	2.04	29.87	4.59	2.33	14.51	0.49	532.30	1.41	5.64

† Neighborhood income (1 = low, 2 = medium, 3 = medium high, 4 = high).
‡ Length of community residency (in years).
§ Point-biserial correlations.
‖ Average daily energy expenditure (in kilocalories).
¶ Number of usual lifestyle activities (6 total).
# Cardiovascular fitness (in milliliters per minute per kilogram).
* $p < 0.001$.
** $p < 0.01$.
*** $p < 0.05$.

physical activity indicators (i.e., LA, VIG, KCAL).

Use of Home vs. Community Environments

In general, the use of home equipment corresponded to behavioral physical activity indicators, whereas the use of community facilities did not. The variety and frequency of home equipment use was positively related to both VIG and LA (See Table 1). No significant bivariate relationships were observed between the variety or frequency of community facility use and physical activity outcomes.

DISCUSSION

Summary

The pattern of findings suggests that these minimally active adolescent girls were more attuned to and likely to use the resources for physical activity located in their home environment as opposed to the community environment, and that variation in their physical activity behavior was more closely aligned to variations in the use of home resources than community resources.

Divergent correlations between adolescent and parent reports support the heightened perception of home-based resources as compared with community-based resources. Whereas adolescents and parents evidenced some level of agreement regarding the number of resources available at home, there was no correlation between adolescent and parent reports with respect to community resources. Disagreement over the availability of resources in the community domain could suggest that (1) adolescents were less informed of community-based resources for physical activity than parents, or (2) parents and adolescents were attuned to different types of resources in the community environment.

Another intriguing finding from this study is the apparent paradox that reported availability of resources at home and in the community were both positively associated with cardiovascular fitness yet unassociated with physical activity behavior. This pattern is not consistent with results of studies using college students.[2] Characteristics of minimally active adolescents such as reduced responsiveness to visual cues provided by exercise environments and limited access to exercise environments due to transportation barriers may account for this discrepancy. There are also several methodological explanations, including (1) the relative reliability and stability of $\dot{V}O_2$peak as a measure compared with self-reported physical activity, which is both extremely variable over time and subject to various recall biases; (2) the role of unmeasured variables (e.g., perceived benefits of and barriers to physical activity) in shaping physical activity partici-

pation; or (3) the restricted variability in both the range of physical activity performed by study participants and the range of community environments, owing to the fact that all participants resided within a relatively homogeneous area.

The relative salience of home resources is demonstrated by the findings that adolescents were much more likely to use available home resources than community resources (37% of home resources used vs. 19% of community resources used), and that use of home resources (but not community resources) was significantly associated with both VIG and LA. The combination of these findings suggests that minimally active adolescents may be more inclined to engage in physical activity in or around the home, and may be less interested in availing themselves of community-based opportunities to be active.

Limitations

The present study had some methodological limitations that should be noted. Sample sizes of 47 (to test adolescent-parent agreement) and 87 (to test relations with physical activity outcomes) lack the statistical power to detect small effect sizes,[10] which may be important from an overall public health standpoint. Additionally, as mentioned before, the restricted range of demographic, environmental, and physical activity variables in the study sample may also have limited the ability to detect correlational relationships.

SO WHAT? Implications for Health Promotion Practitioners and Researchers

Minimally active adolescent girls are poised to develop into sedentary adults and to experience the ill health effects associated with inactivity. The present study suggests that this high-risk group may be more inclined to engage in physical activity in and around the home, and may be more responsive to interventions that focus on this domain (i.e., rather than attempting to draw them out into the community to be physically active).

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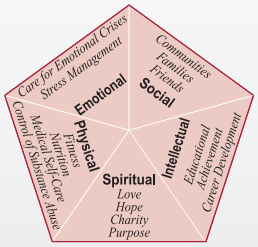

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(O'Donnell, *American Journal of Health Promotion,* 1989, 3(3):5.)

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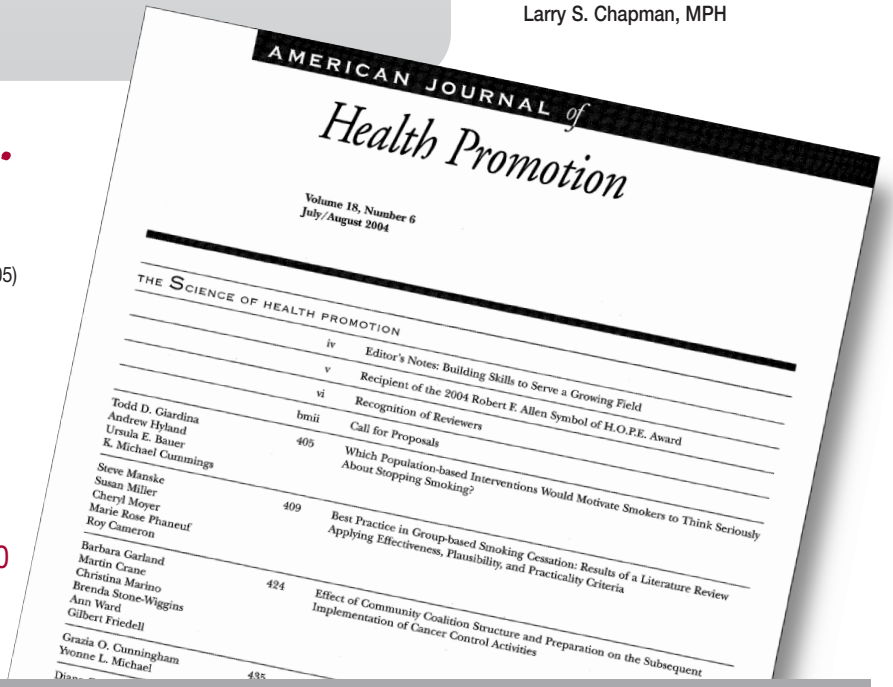
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