Parks and Recreation

Childcare Outdoor Renovation as a Built Environment Health Promotion Strategy: Evaluating the Preventing Obesity by Design Intervention

Nilda G. Cosco, PhD; Robin C. Moore, DiplArch, MCP, HonASLA; William R. Smith, PhD

Abstract

Purpose. *To evaluate the effectiveness of Preventing Obesity by Design (POD), a childcare center outdoor renovation intervention.*

Design. *Pre-post intervention evaluation.*

Setting. *North Carolina licensed childcare centers (N = 27).*

Subjects. *Preschool children.*

Intervention. *Outdoor renovation, teacher training.*

Measures. *Behavior mapping, Preschool Outdoor Environment Measurement Scale (POEMS), center director interview.*

Analysis. *Descriptive statistics, ordinary least squares and logistic regressions calculated to assess levels of association between environmental change, children's physical activity (PA), social behaviors, and environmental quality. Qualitative interview data analyzed to help understand intervention impact.*

Results. *Behavior mapping showed that site layout attributes, such as the form (i.e., "single loop" and "double loop") of pathways (functioning as circulation routes and wheeled toy settings), are associated with higher levels of PA. Teacher interaction was associated with decreased children's PA. Absence of teacher or lack of child/child interaction was associated with increased PA. POEMS assessment of environmental quality was higher after renovation. POEMS domains (Physical Space and Teacher/Caregiver Roles) were positively associated with PA. After renovation, 68% of center directors reported positive changes in children's behavior and 40% mentioned edible plant installations as greatest success.*

Conclusion. *Built environment renovation of childcare center outdoors, including looped pathways installation, coupled with teacher training, may support increased PA. Renovation, including food gardens, may be a key to success for preschool health promotion and support change in childcare policy. (Am J Health Promot 2014;28[3s]:S27–S32.)*

Key Words: Preschool, Playground, Physical Activity, Behavior Mapping, Built Environment, Prevention Research. Manuscript format: research; Research purpose: intervention program evaluation; Study design: pre-post intervention evaluation; Outcome measure: behavioral, environmental; Setting: childcare, state; Health focus: fitness/physical activity; Strategy: built environment and related teacher training, policy; Target population age: preschoolers; Target population circumstances: early childhood education, all income levels, all races/ethnicities

PURPOSE

Of 630,000 North Carolina children aged 2 to 5 years, more than 30% are overweight or obese.[1] Approximately 38% of North Carolina children are enrolled in almost 5000 regulated childcare centers, where they receive most meals and spend most of their waking hours.[2] A 2002 statewide survey suggested that most childcare center outdoor areas did not meet best practice criteria for physical activity (PA), such as high levels of environmental diversity measured by the number and types of play settings present (e.g., gardens, outdoor group gathering spaces, lawns, wheeled toy pathways, and natural elements such as trees, shrubs, logs and rocks; see Figure 1).[3] In 2007, the North Carolina Division of Child Development and Early Education (NC-DCDEE) replaced "playground" with the term *outdoor learning environment* (OLE) in childcare center licensing rules, thereby expanding the function of outdoors beyond informal recreation to include all areas of child development such as health promotion.[4] As reported here, Preventing Obesity by Design (POD), a

Nilda G. Cosco, PhD, and Robin C. Moore, DiplArch, MCP, HonASLA, are at the College of Design, NC State University, Raleigh, North Carolina. William R. Smith, PhD, is at the Department of Sociology and Anthropology, NC State University, Raleigh, North Carolina.

Send reprint requests to Nilda G. Cosco, PhD, NC State University, Campus Box 7701, Raleigh, NC 27695; nilda_cosco@ncsu.edu.

This manuscript was submitted April 30, 2013; revisions were requested August 3, and September 30, 2013; the manuscript was accepted for publication October 7, 2013.

0890-1171/14/$5.00 + 0
DOI: 10.4278/ajhp.130430-QUAN-208

Figure 1
Outdoor Learning Environment Before Renovation

childcare center outdoor renovation intervention, was evaluated to measure impacts on health-promoting PA and garden installation (with potential stimulation of vegetable and fruit consumption).

METHODS

Design

Evaluation of childcare OLE before and after renovation.

Sample

North Carolina–licensed childcare centers (N = 30) were selected through a competitive process. Ten County Smart Start Partnerships chose three childcare centers each from a pool of centers participating in childcare quality enhancement programs across the state. Evaluation included 27 centers.

Measures

(1) Physical Assessment and Outdoor Quality Using Preschool Outdoor Environments Measurement Scale (POEMS).[5] POEMS is a validated, reliable observational tool for evaluating quality of preschool outdoor environments. A class and a target teacher were selected and an observer coded the items for the five domains and categories contained in the scale.

Domain 1: Physical Environment. Built environment relationships that affect basic site functions (e.g., site orientation, drainage, circulation, parking, physical adjacencies).
Domain 2: Interactions. Elements that support (1) interactions with the environment: leaves, flowers, twigs, etc.; (2) child-to-child interactions such as two-person bench, puppet theater; (3) teacher-child interactions during playtime (e.g., facilitation of activities, fostering inquisitiveness); (4) parent-child interactions (e.g., adequate outdoor seating).
Domain 3: Play and Learning Settings. Spaces that support defined activities (e.g., sand and water play, art or music, lawn garden, animal habitat, community and family gathering areas).
Domain 4: Program. As an extension of the classroom, there are diverse materials for science, math, language, art, drama, movement, and music in the outdoors.
Domain 5: Teacher/Caregiver Role. Short questionnaire for target teacher about expertise related to outdoor play and learning, family participation, programming, health and environmental care.

(2) Behavior Mapping.[6,7] Behavior mapping was conducted in 24 of 27 participating centers before and after renovation. Behavior mapping is an unobtrusive, direct observational method for analyzing subject's behavior and associated built environment components (e.g., play setting type). Observers systematically scanned each setting recording: (1) location of children, (2) gender, (3) PA level, (4) social interactions (alone, pair, group), and (5) teacher interactions with children (not present, positive, custodial, negative). For this study, observers entered data in handheld computers (PDA Dell Axim Pocket PC, Austin, Texas). Physical activity level was assessed by using a validated scale (Children's Activity Rating Scale [CARS]).[8] CARS allows trained observers to record children's activity on a five-point scale: (1) stationary or motionless, (2) stationary with limb or trunk movements, (3) slow-easy, (4) moderate, and (5) fast.

(3) Center Director Interview. Directors were interviewed at the end of the project to gather information about the impact of outdoor renovations on children's behavior, perceived achievements, challenges and obstacles for implementation, and evaluation of the process followed. Responses were tallied. Full results of the interview will be reported elsewhere.

Table 1
Correlation of Postdesign With Pathway Layout, POEMS Scores, and Social Interactions Variables and Their Effects on PA*

Pathway Layout		POEMS		Social Interactions	
Connected single or double loop	0.333 (0.070)	Physical Environment Domain	0.507 (0.051)	Custodial teacher-child interaction	−0.156 (−0.095)
Linear/straight	−0.158 (0.039)	Interactions Domain	0.389 (−0.007 ns)	Negative teacher-child interaction	0.030 (−0.034)
No pathway	−0.422 (0.011ns)	Play and Learning Domain	0.535 (0.008 ns)	No teacher present	0.082 (−0.002 ns)
Other pathway types†	0.123 (referent)	Program Domain	0.562 (−0.011 ns)	Positive teacher-child interaction	−0.064 (−0.088)
		Teacher/Caregiver Role Domain	0.352 (0.039)	Child is alone	0.195 (referent)
		Total rating	0.618 (ne)	Child is with one other child	−0.034 (−0.031)
				Child is in group	−0.168 (−0.113)

* The dummy variable indicating whether an observation was post design (coded as 1) versus pre design (coded as zero) is correlated with each of the variables. The second number in each cell of the table (in parenthesis) is the standardized beta coefficient in a regression equation with physical activity (coded 1 to 5) as the dependent variable, and all the other variables in the table among the independent variables. All coefficients are statistically significant at $p < 0.05$ unless otherwise indicated as "ns" (not significant). Coefficients that cannot be estimated due to multicollinearity are indicated as "ne" (not estimated).

† Linear/straight and connected loop; single- or double-loop island; linear/straight and rectangular loop.

Intervention

POD is an ongoing comprehensive statewide intervention for increasing early childhood PA and food awareness by improving childcare center outdoor built environments through evidence-informed design assistance, teacher training, and dissemination of information. The project evaluated here combined design expertise on children and family outdoor environments and the infrastructure of a statewide early childhood technical assistance agency (North Carolina Partnership for Children). POD is based on research that shows (1) children's PA is motivated by diverse outdoor environments,[9] (2) active preschoolers retain higher levels of PA as school-aged children,[10] (3) the preschool outdoors is a determinant of preschool PA,[11] and (4) gardens that support children's engagement with vegetables and fruits and frequency of their consumption are associated with acceptance of diverse tastes[12,13](food awareness) as a positive strategy to support healthy eating.[13–16] Selected through a competitive process, 10 county Smart Start Partnerships chose three preschools each from a pool of centers participating in childcare quality enhancement programs. The POD team worked directly with local early education technical assistance professionals and providers, using a train-the-trainers approach to transfer knowledge about designing and managing outdoor environments to support PA, increase food awareness, and encourage healthy eating, including the following steps:

1. Participatory design assistance to facilitate incremental development of the outdoors (community stakeholder and design programming workshops, evidence-informed outdoor design by trained landscape designers, design reviews with childcare center staff, phasing plan, construction cost opinion, health and safety regulation review, affordable renovation solutions, planting suggestions).
2. Site assessment using POEMS.
3. Small "seed grants" ($2000–$3000) to support the cost of design implementation, construction materials, plants, and gardening tools.
4. Teacher training workshops and Webinars on use of renovated outdoor settings to promote PA, food awareness, and healthy eating.
5. On-call, on-site, and Web-based technical assistance.
6. Dedicated Web site section for each participating center.
7. Evaluation of postrenovation, using behavior mapping, POEMS assessment, center director survey, and interview.

Analysis

Ordinary least squares and logistic regressions were estimated for base models of PA. Multicollinearity issues limited full testing of all measured factors simultaneously, but bivariate correlations revealed positive associations of the intervention with pathway form, social interaction, and two POEMS domains (Physical Environment and Teacher/Caregiver Role). The dependent variable, child's PA, was conceptualized as both a continuous and as two dichotomous variables: "nonsedentary" (NonSed) and "moderate or vigorous physical activity" (MVPA). The five categories of the CARS measure is treated as a continuous variable (1) stationary or motionless, (2) stationary with limb or trunk movements, (3) slow-easy, (4) moderate, and (5) fast. As for the two dummy dependent variables, the nonsedentary dummy variable consists of the CARS values of 3, 4, 5 = 1 (else = 0) and the MVPA dummy variable 4,5 = 1 (else = 0). In total, 6596 observations of 804 preschoolers were included in the analysis. Note that a child could have

Figure 2
Outdoor Learning Environment After Renovation

been observed more than once during an observation period.[8]

RESULTS

Behavior mapping showed that site layout attributes, such as the form (i.e., "single loop" and "double loop") of pathways (functioning as circulation routes and wheeled toy settings), were associated with higher levels of PA and that teacher interactions were associated with decreased children's PA (Table 1). Cohen's kappa for pre-post renovation periods, .719 and .832 respectively, indicate that when pairs of observers were used, there were high levels of agreement between them as to how active the target child was. Thus, children's level of activity was reliably measured. After renovation, POEMS assessment of overall environmental quality was higher and two POEMS domains, Physical Environment and Teacher/Caregiver Role, were positively associated with PA (Figure 2, Table 1; $p < .05$).

After renovation, 68% of center directors reported positive changes in children's behavior and 40% mentioned edible plant installations as greatest success.

Regression Results Explaining Child Physical Activity

The base model controlling only for gender was processed for each of the three PA outcome variables. On average, girls were less physically active than boys and less likely to be classified as nonsedentary (35.7% less than boys) or engaged in moderate to vigorous activity (38.9% less than boys). Children observed after outdoor renovations were 22% more likely to be engaged in nonsedentary activity. So, independent of gender, children were more likely to be engaged in nonsedentary activity in renovated OLEs (Table 2).

Correlations between pre-post intervention and pathways, POEMS scores, and social interactions showed that children's PA is related to both OLE physical components and social interactions.

Pathway Characteristics and Physical Activity. Changes in the built environment influence children's activity[11,15] and pathway layout is associated with increased preschool PA.[7] This evaluation study (considering only pathway design) confirms previous findings[17] and shows renovated OLEs have more connected single- or double-loop pathways ($r = .333$), fewer instances of no pathways ($r = -.422$), fewer linear/straight pathways ($r = -.158$), and more variety of pathway forms ($r = .123$) such as "linear connected to rectangular loops," "linear connected to double loops," and "single- or double-loop islands" (i.e., circular pathways that are not connected to center buildings or adjacent settings).

Although "linear or straight pathways" were a more common preintervention condition and afforded increased activity, after renovation, "connected single and connected double loops" appear associated with higher levels of activity than "linear/straight" types (.070 vs. .039). Lack of pathway is not associated with PA.

Social Interactions. As in previous investigations,[18] findings indicate that social interactions in preschool outdoor learning environments were associated with the level of children's activity. Interaction between children and teacher was coded as positive, negative, or custodial (e.g., tying shoe laces,

Table 2
Base Models, Unstandardized and Standardized Effects (in Parenthesis), N = 6596†

IVs	OLS Physical Activity (1–5)	Logistic (0–1) NonSed PA	Logistic (0–1) MVPA
Female	−0.183 (−0.114)*	−0.442 (0.643)*	−0.492 (0.611)*
Post observation	0.113 (0.067)*	0.202 (1.22)*	0.061 (1.063)
Adj R-Sq or Nagel R-Sq	0.018	0.020	0.013

† IVs indicates independent variables; OLS, ordinary least squares; NonSed, nonsedentary physical activity; MVPA, moderate-to-vigorous physical activity; Adj R-Sq, adjusted R-squared; and Nagel R-Sq, Nagelkerke R-squared.
* Statistically significant at 0.001 level.

offering water). Postobservations show less custodial teacher-child interactions (−.156), more negative teacher-child interactions (.030), more with no teacher present (.082), and more children observed alone (Table 1). In terms of the effects on PA, custodial teacher-child interaction is associated with less PA (−.095), as is child presence with others (dual and group situations, −.031 and −.113, respectively). In summary, any type of teacher interaction (including positive) decreased the amount of children's PA, as children stop what they are doing when an adult addresses them, engages in a conversation, or coordinates play activities. Therefore, the absence of teacher in the observation zone was associated with increased PA. Lack of interactions with other children was also associated with increased activity possibly owing to the inability of coders to identify play partners when the activity was fast—i.e., running or riding wheeled toys.

Overall Quality of OLEs. All POEMS ratings were higher post renovation. Physical Environment and Teacher/Caregiver Role domains were positively associated with preschool activity. These domains assess environmental conditions and teacher expertise in outdoor play and learning, respectively. Trained teachers allowed children to play freely without interruptions and did not intervene as often.

When interviewed, 68% center directors reported positive postintervention change in children's behavior ("Kids play differently, more creatively." "More ways for disabled children to play and interact." "Kids are excited about tasting veggies.") and 40% reported edible plant installations as "greatest success."

DISCUSSION

The POD evaluation showed significant associations between increased preschool PA and postrenovation site attributes, such as the form of pathways and overall quality of the physical environment, as measured by POEMS. The creation of vegetable gardens fostered a sense of accomplishment and supported children's sampling of fresh produce.

Although it may appear as counterintuitive, interaction with teachers was associated with decreased children's PA, and the absence of teacher present in the setting was associated with increased PA. Conventional wisdom suggests that when teachers interact with children their activity level increases. However, in this case lack of teacher's interactions could be interpreted as teachers' more skillful facilitation of children's play. Trained teachers, who understand children's diverse skills and learning styles, were observed bringing outdoor toys to play areas and, in general, allowing children's play to flow naturally without interruption (also documented in POEMS Domain 2: Interactions).

The reverse may also be assumed—that low environmental diversity would require increased teacher intervention to direct more structured play as a substitute for children's self-directed activity observed in rich outdoor environments.

The significant association between increased preschool PA and the form of pathways (i.e., looped or double looped), replicates earlier findings by Cosco[17] and supports the notion that looped pathways offer children continuous visual tracks that encourage running and riding activities, offer a route of circulation providing access to other behavior settings in a safe and orderly manner and that, in turn, stimulate children's movement in the space.

The installation of gardens, considered by interviewed directors as their greatest success, not only improved OLE environmental quality but also offered children attractive, hands-on gardening activities to support the tasting of new types of vegetables and fruit. The construction of gardens also brought the community together around a common, meaningful purpose to improve children's environments.

The POD evaluation results may encourage "built environment" professionals (i.e., landscape architects/designers, architects, and horticulture specialists) to continue their efforts to improve children and family outdoor areas by more carefully considering site layout and physical components. Current built environment research in childcare, although suggesting the emergence of a specialized field, looks almost exclusively at childcare center–level factors rather than relationships between specific physical attributes and components and related health outcomes. The significance of this study for designers is that it offers specific guidance in setting function, component selection, and spatial relationships between them.

The results add much needed, evidence-based guidance for future interventions and investments in early childhood outdoor environment renovation or new construction. Results may also be used to update childcare facility licensing regulations and policies, and could continue to support the development of more rigorous evidence-based best practice indicators for design and management of outdoor spaces for young children.

Environmental interventions coupled with teacher training appear to be a potentially successful strategy to

SO WHAT? Implications for Health Promotion Practitioners and Researchers

What is already known on this topic?

Attending preschool is a significant predictor of physical activity of 3- to 5-year-olds. Time outdoors is a strong correlate of physical activity. Variations in physical activity may be attributed to preschool policies, practices, installation of gardens, and outdoor built environment design.[10,13,18–20]

What does this article add?

Evaluation of evidence-informed preschool outdoor built environment renovation (executed by trained design professionals), using novel assessment methods linking preschool activity to *specific* built environment components, may increase understanding of positive influence of renovated built environment on preschool physical activity. Multiple teacher training approaches linked to the renovation of their childcare outdoor environment may change teacher practice to allow children to play freely, which may increase physical activity. Center directors may regard installation of edible gardens as a positive achievement (perhaps due to potential effects on healthy eating).

What are the implications for health promotion practice or research?

Childcare policy supporting renovation of preschool outdoor built environment with teacher and community participation can be an effective health promotion strategy. Addition of looped pathways and diverse settings, including shade trees, perennial fruiting species, and vegetable gardens, may support increased preschool physical activity and food awareness (acceptance of diverse tastes) as a potential precursor for consumption of fresh vegetables and fruits. Teacher training in understanding the role of rich outdoor built environments, play, and outdoor programming may support PA and food awareness outcomes.

support preschool PA in childcare outdoor learning environments.

Limitations

Findings may not be generalizable, as North Carolina climate, geography, and early education regulations may be dissimilar to other locations. Project evaluation data are limited to small convenience sample without control sites. Impact of gardening experience (rather than presence of gardens) on vegetable and fruit consumption was not evaluated.

Acknowledgments

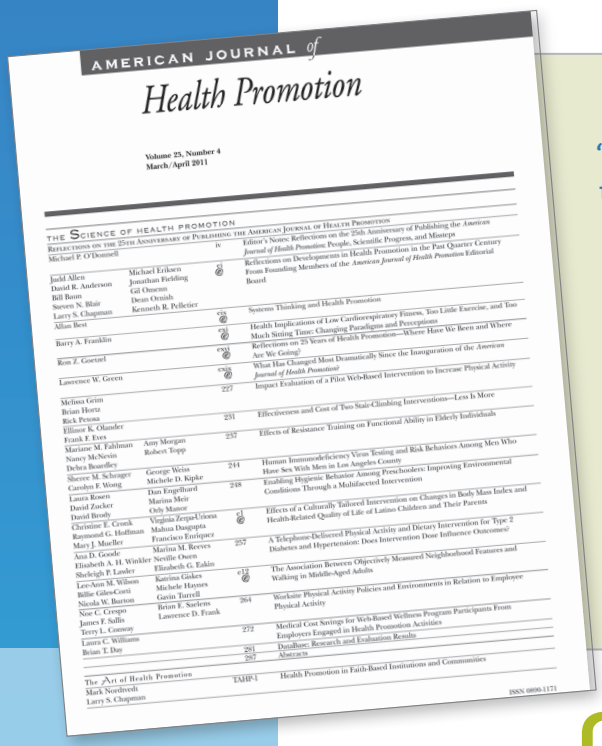
Preventing Obesity by Design (POD) was supported by the Blue Cross and Blue Shield of North Carolina Foundation (BCBSNC). The authors recognize the contributions to POD from the Natural Learning Initiative team: Brad Bieber, Julie Murphy, Michele Rivest, Jesse Turner, and Eli Valsing.

References

1. CDC. North Carolina State nutrition, physical activity, and obesity profile. Available at: http://www.cdc.gov/obesity/stateprograms/fundedstates/pdf/north-carolina-state-profile.pdf. Accessed May 10, 2013.
2. DCDEE. Child care snapshot, North Carolina Division of Child Development and Early Education. Available at: http://ncchildcare.dhhs.state.nc.us/general/mb_snapshot.asp. Accessed May 10, 2013.
3. Moore R, Cosco N. *Baseline Survey of Environmental Conditions of Outdoor Play Areas in North Carolina Childcare Centers.* 2002. Unpublished report.
4. DCD. North Carolina Division of Child Development: Child Care Center Handbook. 2009. Available at: http://ncchildcare.dhhs.state.nc.us/pdf_forms/center_printercopy.pdf. Accessed May 10, 2013.
5. DeBord K, Hestenes L, Moore R, et al. *Preschool Outdoor Environment Measurement Scale-POEMS.* Winston Salem, NC: Kaplan, Inc; 2005.
6. Cosco N, Moore R. Using behaviour mapping to investigate healthy outdoor environments for children and families: conceptual framework, procedures and applications. In: Ward-Thompson C, Aspinall P, Bell S, eds. *Innovative Approaches to Research Landscape and Health.* London, United Kingdom: Taylor & Francis; 2010.
7. Cosco N, Moore R, Islam Z. Behavior mapping: linking preschool physical activity and outdoor design. *Med Sci Sports Exerc.* 2010;42(3):513–519.
8. DuRant RH, Baranowski T, Puhl J, et al. Evaluation of the Children's Activity Rating Scale (CARS) in young children. *Med Sci Sports Exerc.* 1993;25(12):1415–1421.
9. Boldemann C, Blennow M, Dal H, et al. Impact of preschool environment upon children's physical activity and sun exposure. *Prev Med.* 2006;42(4):301–303.
10. Moore L, Nguyen U, Rothman K, et al. Preschool physical activity level and change in body fatness in young children. *Am J Epidemiol.* 1995;142(9):982–988.
11. Cardon G, Van Cauwenberghe E, Labarque V, et al. The contribution of preschool playground factors in explaining children's physical activity during recess. *Int J Behav Nutr Phys Act.* 2008;5(11):1–6.
12. Cabalda A, Rayco-Solon P, Solon JA, Solon F. Home gardening is associated with Filipino preschool children's dietary diversity. *J Am Diet Assoc.* 2011;(111):711–715.
13. Castro D, Samuels M, Harman A. Growing healthy kids: a community garden-based obesity prevention program. *Am J Prev Med.* 2013;44(3S3):S193–S199.
14. Meinen A, Friese B, Wright W, et al. Youth gardens increase healthy behaviors in young children. *J Hunger Environ Nutr.* 2012;7:192–204.
15. Story M, Kaphingst K, Robinson-O'Brien R, Glanz K. Creating healthy food and eating environments: policy and environmental approaches. *Annu Rev Public Health.* 2008;(29):253–272.
16. Benjamin-Neelon S, Evans K. *Preschool Garden Strategies to Combat Early Childhood Obesity, Brief 4.* Durham, NC: Center for Child and Family Policy, Duke University; 2011.
17. Cosco N. *Motivation to Move: Physical Activity Affordances in Preschool Play Areas* [dissertation]. Edinburgh, Scotland: Heriot-Watt University/School of Landscape Architecture. London, United Kingdom: British Library; 2006.
18. Brown W, McIver K, Pfeiffer K, et al. Social and environmental factors associated with preschoolers' nonsedentary physical activity. *Child Dev.* 2009;80(1):45–58.
19. Pate RR, Pfeiffer KA, Trost SG, et al. Physical activity among children attending preschools. *J Pediatr.* 2004;114(5):1258–1263.
20. Ward D. Physical activity in young children: the role of child care. *Med Sci Sports Exerc.* 2010;42(3):499–501.

AMERICAN JOURNAL *of* Health Promotion

The Wisdom of Practice and the Rigor of Research


AMERICAN JOURNAL of Health Promotion

Volume 25, Number 4
March/April 2011

THE SCIENCE OF HEALTH PROMOTION

"The American Journal of Health Promotion provides a forum for that rare commodity — practical and intellectual exchange between researchers and practitioners."

Kenneth E. Warner, PhD
Dean and Avedis Donabedian Distinguished University Professor of Public Health
School of Public Health, University of Michigan

"The contents of the American Journal of Health Promotion are timely, relevant, and most important, written and reviewed by the most respected researchers in our field."

David R. Anderson, PhD, LP
Senior Vice President & Chief Health Officer, StayWell Health Management

Be the first to know.

onlineFirst

Available exclusively to ONLINE SUBSCRIBERS

The American Journal of Health Promotion is now publishing all articles online, ahead of print. Articles are available as a PDF document for download as soon as they have completed the review process. This means you can access the very latest papers in the field of health promotion – in some cases up to a year before they appear in print.

Subscribe Today.

Subscribe Online at www.HealthPromotionJournal.com
Call 800-783-9913 (US only) or 731-645-4496

ANNUAL SUBSCRIPTION RATES: (Effective 1-1-14 through 12-31-14)

	INDIVIDUAL	INSTITUTION			
	Print + Online	Tier 1 Print + Online Online Only	Tier 2 Print + Online Online Only	Tier 3 Print + Online Online Only	Print Only*
U.S.	$139	$359	$459	$559	$184
Canada and Mexico	$148	$368	$468	$568	$193
Other Countries	$157	$377	$477	$577	$202

*Print-only subscriptions are based on location. For multi-site institutions, each site must have its own subscription.

Tier 1 — Most Employers and Corporations except Health Organizations, Libraries and Schools

Tier 2 — Health Organizations including Hospitals, Clinics, Health Promotion Providers, Insurance Companies and Voluntary Health Agencies

Tier 3 — Libraries, Colleges and Universities