Health Opportunities with Physical Exercise (HOPE): social contextual interventions to reduce sedentary behavior in urban settings

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Abstract

Physical activity interventions targeting social and physical environments of the urban poor hold promise in improving health outcomes in underserved communities. This study randomly assigned overweight, sedentary, economically disadvantaged adults to one of three intervention conditions at The Hope and Healing Center, a large inner-city health facility providing numerous options for exercise. Within the tenets of Social Action Theory, the Health Opportunities with Physical Exercise (HOPE) trial will test the efficacy of two behavior change models, social support and patient–provider interaction, to increase physical activity. In addition to a standard care condition, in which patients have open access to Hope and Healing physical activity programming, patients were assigned to one of two behavior change interventions. Those assigned to patient–peer receive face-to-face, systematic and scheduled encouragement from study-trained ‘peer’ interventionists at the facility. Patients assigned to patient–provider receive face-to-face, systematic and scheduled encouragement provided by study-trained ‘provider’ interventionists also at the facility. The primary outcomes of change in exercise behavior will be documented by self-reported physical activity and confirmed by fitness testing at baseline, 6, 12 and 24 months during the 1 year of active intervention and 1 year of relapse prevention follow-up. Intervention conditions will be compared on psychosocial mediators including motivational appraisals, ratings of social support, rapport, problem solving and self-efficacy for overcoming barriers to increased physical activity. Novel aspects of this intervention include: (1) delivery of socially based physical activity interventions to an economically disadvantaged urban population, (2) reduction of environmental barriers to be physically active and (3) emphasis on social interactions influencing health habit change. Results of this study have the potential to identify mechanisms of behavior change that could be adopted by physical activity interventions aimed at reducing sedentary behavior and health disparities in high-risk, underserved populations.

Introduction

Inadequate physical activity is one of the most pervasive and intractable problems that substantially contributes to ill health in the US (Pate et al., 1995a). Urban-dwelling African-Americans compared to European-Americans suffer disproportionately high rates of numerous serious degenerative and chronic diseases, particularly all forms of cardiovascular disease (Gillum, 1996). It is likely that a portion of this wide racial disparity in health, in general, and cardiovascular health, in particular, results from inadequate physical exercise (Crespo et al., 2000; Brownson et al., 2000a). This report describes an innovative new approach...
to addressing health promotion in urban minorities through a collaborative research effort between a faith- and community-based non-profit prevention center, The Hope and Healing Center of Memphis, and the University of Tennessee Health Science Center, Memphis, Department of Preventive Medicine.

The project described in this report follows a rationale described in the Activity Counseling Trial (ACT) (King et al., 1998; Albright et al., 2000) which was motivated by the premise that while health benefits of exercise are sufficiently well documented, methods to foster and maintain healthy levels of physical activity are not. In ACT, health-care providers delivered physical activity counseling to their patients to promote exercise behavior change. Fashioned after ACT, participants in the Health Opportunities with Physical Exercise (HOPE) trial are receiving physical activity counseling in a health promotion facility after being enrolled by their primary care physician. Currently enrolled HOPE participants are 72% African-American and 88% female. This report documents the need for this intervention, describes the rationale and theoretical basis for this approach to promoting physical activity, and details how health care providers and interventionists will accomplish the goals of the project.

**The epidemiology of sedentary lifestyle**

Since publication of results of the Harvard Alumni Study (Paffenbarger et al., 1995), there has been a massive accumulation of evidence that supports the premise that sedentary lifestyles are a primary cause of cardiovascular disease, cancer at certain important sites and numerous other morbidities (Blair et al., 1995; Broman, 1995; Pate et al., 1995a). Yet, few Americans are regularly physically active. Only 22% of adults in the US meet the recommended leisure time physical activity levels for health benefits as defined by the objectives of Healthy People 2000, while another 54% of adults are inadequately active and another 24% are completely sedentary (Pate et al., 1995a,b).

Furthermore, the Surgeon General has reported that African-Americans and those with low income and educational attainments are even more sedentary than their respective counterparts. Specifically, results from three large national surveys showed that European-Americans self-reported levels of sedentary behavior during leisure time ranged from 18.2 to 26.8% compared to 28.4–38.5% reported by African-Americans. Additionally, 2- to 3-fold greater levels of inactivity were reported from lowest to highest income categories. Specifically, as few as 10.9–17.8% of respondents with an annual family income of $50,000 or more compared to 30.3–41.5% of respondents with an income less than $10,000 reported no leisure time physical activities. Similar findings with education were documented. Reports of inactivity for those with a college degree (16+ years) ranged from 11.1 to 17.8% as contrasted to the lowest education category (<12 years) where the frequency of inactivity increased sizably, ranging from 34.5 to 46.5% (US Department of Health and Human Services, 1996).

These categorical percentages may not fully describe the gradient of sedentary behavior that exists across risk groups of race/ethnicity, income and educational attainment strata (Luepker et al., 1993; Kaplan and Keil, 1993; US Department of Health and Human Services, 1996; Iribarren et al., 1997). Economically disadvantaged residents of urban areas (Brancati et al., 1996) present one of the highest risk groups for sedentary living and subsequent threats to health. While these social and racial gradients in health have been explained by various mechanisms from lack of medical care to poverty itself, the connection to behavioral and lifestyle factors also needs consideration (Adler et al., 1993).

**Breaking down the barriers to exercise in urban settings**

Despite the causes of economic disadvantage and the numerous associated health risks, these interrelated conditions working either simultaneously or sequentially over a lifetime have created sizable health disparities for most urban-dwelling African-American adults (Gillum, 1996). While methods
to estimate the true extent of mortality differentials across socioeconomic (SES) strata are improving (Rogot et al., 1992; Sorlie et al., 1992), they remain estimates and do not clarify the causal reasons for these differentials. Even recent large prospective epidemiological studies that made overt efforts to include all SES strata in their samples reported difficulties with ascertainment and retention of low SES participants, particularly low SES African-Americans (Jackson et al., 1996).

Furthermore, disadvantaged urban environments suffer from well-known problems such as unsafe neighborhoods and lack of facilities. It is also likely that inflexible work hours, along with little encouragement or opportunity to exercise on the job (Nies et al., 1999) and limited financial resources for leisure time activities, contribute substantially to patterns of inactivity.

Changing the action context—overview of the hope and healing center

The Church Health Center of Memphis (CHC) opened on 1 September 1987 as a health clinic for the working poor. The majority of the clinic staff are local volunteer physicians who typically donate 6 h per year to treat patients at the Church Health Center. Their volunteer efforts, together with several highly dedicated staff physicians, bring quality medical care to over 30 000 patients who would otherwise have no access to health services. The CHC leadership became concerned that the majority of their patients were suffering from preventable illnesses (Garrison et al., 1999).

To address this chronic need, plans began to create a program called Hope and Healing that would focus its efforts on primary disease prevention to serve the larger midsouth community. A large (80 000-sq. ft) fitness and rehabilitation center located in the downtown area, owned by a local health care system was leased to CHC beginning 1 April 1998 for a 10-year period. A major renovation of this facility, supported by local foundations and corporations was completed in December 1999. Known as The Hope and Healing Center, this facility has adequate space for a wide variety of exercise options. These opportunities for physical activity include walking or running on indoor paths, cardiovascular exercise equipment, aerobics, dance and water aerobics, and are provided at affordable cost based on sliding scale fees.

Overview of HOPE’s theoretical approach: introducing ‘Social Interaction Processes’

We have followed the process of intervention planning described by (Bauman et al., 1991). Specifically, four steps are included in this process:

1. Identifying a theoretical model to guide the intervention.
2. Developing a conceptual model that adapts the chosen theory to the behaviors of interest.
3. Developing an operational model to map a conceptual model into specific intervention strategies.
4. Developing an implementation model that specifies the organization, delivery, and evaluation of the intervention linkage with the desired outcomes.

Our goals in identifying a theoretical model for physical activity change were to find a model that provided a foundation for intervention design and provided a framework for mediational analyses. In general, behavioral change promotion is understood to be influenced at multiple levels (McLeroy et al., 1988) and specific application of ecologic models to physical activity has been presented (Sallis and Hovell, 1990; Sallis et al., 1998; Sallis and Owen, 1999).

Empirical evidence suggests the importance of various domains and constructs. For example, environmental barriers associated with physical inactivity have included concerns about neighborhood safety (Sallis et al., 1997; Eyler et al., 1998), convenience of facilities and programs for exercise (Sallis et al., 1997, 1990; Eyler et al., 1998), and absence of enjoyable outdoor scenery (King et al., 2000). Sociodemographic aspects of inactivity have already been cited (Garrison et al., 1993). More
examples are inactivity appears to be related to more infrequently observing exercisers in one’s neighborhood (King et al., 2000), and social isolation and lack of social support are influential in predicting physical inactivity (Sallis et al., 1987; Eyler et al., 1999; Steptoe et al., 2000).

While interventions to increase activity by changing environmental contexts, such as walking paths, have not been widely tested, such interventions appear promising (Brownson et al., 2000b). Further, behavioral counseling offered in healthcare settings shows promise in increasing physical activity levels (Calfas et al., 1996; Steptoe et al., 1999; Albright et al., 2000; Eakin et al., 2000). Finally, numerous investigations have reported relationships between physical activity and psychological variables [for reviews, see (Sallis and Owen, 1999)]. Specifically low self-efficacy, low motivation, depression and anxiety have all been related to physical inactivity.

Based on the aims of our current study and the empirical evidence, a contextual theoretical framework was chosen that addressed environmental context, sociocultural characteristics and psychological processes related to behavior change and applicable to physical activity. We sought an interactional and dynamic model of behavior change that would aid our understanding of (1) environmental barriers, (2) sociocultural factors and (3) individual-level psychological processes. Based on these prerequisites, we chose Social Action Theory (SAT) (Ewart, 1991, 1999) as our primary theoretical framework, and infused additional elements of Social Cognitive Theory (SCT) (Bandura, 1986), Social Support Theory (Heaney and Israel, 1997) and provider communication theory (Roter and Hall, 1997; Roter and Hall, 1991) into this integrative framework. The choice of SAT (illustrated in Figure 1) allowed us a framework to design theoretically based intervention components and strategies, to obtain assessment of mediating variables of behavior change, and to understand the potential influences of moderating variables related to our study.

Review of theory-based interventions to decrease sedentary behavior

The majority of physical activity interventions has been delivered through individual programming and has been focused on prompting personal change (US Department of Health and Human Services, 1996). Behavioral interventions to promote physical activity have most often been designed based on cognitive and behavioral strategies derived from SCT (Bandura, 1986). SCT purports that individual behavior is reciprocally influenced by personal factors, factors related to the target behavior, and with social and physical environmental factors. Consistently documented and modifiable determinants of physical activity described in the literature include enjoyment of exercise, perceived benefits and lack of perceived barriers to being physically active, self-efficacy or confidence to exercise, and, finally, social support for exercise (US Department of Health and Human Services, 1996).

Physical activity interventions have expanded from SCT-based strategies targeted at individuals or individuals in small-group settings to health promotion interventions in community settings. An example of a well-designed physical activity intervention developed for a community-based primary healthcare setting is the ACT. This intervention targeted change in mediating personal factors and to a lesser extent social influence through physician follow-up counseling delivered to healthy, sedentary adults (King et al., 1998; Albright et al., 2000). Although, several large community and work-site physical activity interventions have been conducted, empirical information is not readily available on social and environmental influences on physical activity behavior (US Department of Health and Human Services, 1996). Social factors including modeling of activity by others and direct social support from others appear to be related to physical activity participation (Sallis and Hovell, 1990). While less evidence exists about the mediating influence of environmental factors on physical activity (Sallis and Owen, 1999), this may be a promising area of intervention. Even less developed
and understood are theory-based physical activity interventions targeting working poor and underserved groups (Taylor et al., 1998).

SAT specifically emphasizes the importance of social interactions and environmental context in adoption and maintenance of behavior. Given this lack of empirical validation, manipulation of social and environmental contexts needs further study, as no physical activity interventions to date have targeted these variables in physical activity adoption and maintenance among unhealthy sedentary adults who lack adequate access to health care, much less opportunities for preventive services. HOPE’s intervention strategies are based on SCT principles well-established in the physical activity literature while also targeting social variables found to influence physical activity participation (Sallis and Hovell, 1990), and social and environmental factors thought to sustain behavior change (Ewart, 1991). Therefore, based on empirical and theoretical aspects of SCT and SAT (Ewart, 1991), we postulate that cognitive-behavioral physical activity interventions which provide readily available access to facilities, resources and social support for health behavior change hold great promise for adoption and maintenance of physical activity among sedentary urban-dwelling overweight persons.

Translating theory to intervention strategy
The HOPE trial will compare two theoretical models, which emphasize the importance of social influence in prompting behavior change. Social support theory (Heaney and Israel, 1997) and patient–provider communication theory (Roter and Hall, 1997) are being tested as viable models of socially oriented physical activity change based on tenets of SAT and SCT derived approaches. In operationalizing change in the environmental context, the creation of the Hope and Healing Center is a necessary, but probably, not sufficient condition for decreasing sedentary behavior in this population. Most important, will be the support, encouragement and direction each participant receives from the intervention delivered in HOPE.

According to SAT, supportive patient–peer mentoring may be superior to enhanced patient–provider communication as an intervention model for exercise behavior change. Social support theory posits that an imbalance between environmental demands and an individual’s resources to cope with these demands triggers a cycle of stress and perceived lack of control which contributes to unhealthy behaviors. The peer intervention developed for HOPE seeks to enhance perceived behavioral control by fostering participation in decision making about adopting physical activity and by minimizing environmental sources of stress through supportive peer modeling of physical activity behaviors. Peer mentors who are regularly physically active will be trained to provide four types of social support to HOPE participants assigned to this arm of the study. Peers will provide regular and systematic support to participants at Hope and

Fig. 1. Social Action Theory (Ewart, 1991).
Healing by engaging in a variety of personal and/or group contacts with participants at the facility using Emotional Support, Instrumental Support, Informational Support and Appraisals Support as described in Social Support Theory (Heaney and Israel, 1997).

In contrast, patient–provider communication theory (Roter and Hall, 1997) posits that effective interactions with a health care provider in which the provider seeks to develop an enhanced relationship with the patient by seeking to understand patient beliefs and values regarding the unhealthy behavior will foster physical activity change. Health-care providers in the field of physical activity will be trained specifically to deliver regular planned contacts with participants assigned to this arm which incorporates the following four communication processes: interpersonal interaction, conflict resolution and negotiation, information and cognition processing, and social influence. Both intervention conditions described above will include delivery of self-regulatory skill-building and will take place with participants at Hope and Healing.

As can be seen in Table I, the initial translation from theory to intervention delivery is based on targeting change at the personal or individual level by initiating a series of social, cognitive and behavioral self-regulation strategies. Processes of self-regulation posited to be mediators of targeted behavior change include building motivation, providing reinforcement for the new behavior, and learning how to problem-solve and cope with barriers. The HOPE intervention will extend our understanding of traditional self-regulatory skills, typically delivered in social cognitive frameworks, by targeting two additional social and contextual elements to elicit behavior change (e.g. social interactions and an available action context).

The HOPE intervention trains peers and providers to deliver the same intervention in regards to modes of contact, frequency of contacts and length of contact with participants. Thus, during the first week of intervention, all participants will have one, hour-long, face-to-face session with their assigned peer or provider. The initial session will aim to outline all future intervention contacts at Hope and Healing, to establish rapport with their assigned interventionist (e.g. peer or provider), and to develop the initial physical activity plan with specified behavioral goals. Next, once-weekly 20 min face-to-face contacts will occur during the first month at Hope and Healing. Start-up sessions during the first month of contact will encourage direct hands-on contact with participants.

### Table I. Translation from theory to intervention delivery

<table>
<thead>
<tr>
<th>SAT theory-based mediators of physical activity changes</th>
<th>Intervention goal targeted for change</th>
<th>Intervention components used to promote change</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Personal factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>cognitive → self-efficacy</td>
<td>self-talk, goal-setting</td>
<td>face, phone and mail contacts</td>
</tr>
<tr>
<td>emotional → enjoyment</td>
<td>rewards, benefits</td>
<td>contacts plus logs and incentives</td>
</tr>
<tr>
<td>behavioral → self-regulation</td>
<td>monitoring, feedback, reinforcement, relapse</td>
<td>attendance records, pedometers, facility scan system</td>
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<tr>
<td><strong>Social factors</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>modeling</td>
<td>support</td>
<td></td>
</tr>
<tr>
<td>communication</td>
<td>enhanced communication</td>
<td>assigned peer mentor</td>
</tr>
<tr>
<td>support</td>
<td>increase reinforcing social interactions</td>
<td>assigned caring provider</td>
</tr>
<tr>
<td><strong>Context factors</strong></td>
<td>Hope and Healing</td>
<td>paid memberships</td>
</tr>
<tr>
<td>facility</td>
<td>staff, peers, providers</td>
<td>referral pads to local MDs</td>
</tr>
<tr>
<td>resources</td>
<td>machines, classes, sports</td>
<td>exercise assessment, schedules</td>
</tr>
<tr>
<td>programs</td>
<td>chapel services, imagery</td>
<td>available to all members</td>
</tr>
<tr>
<td>spiritual</td>
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</table>
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on the exercise floor at Hope and Healing. The interactions are designed to enhance participant’s skills for use of the Sports Court, the walking track, the cardiovascular equipment, the stretching area, the Kaiser equipment and aerobics classes.

During the remainder of the intervention period, face-to-face and phone follow up sessions at Hope and Healing will occur a minimum of once per month during months 2–24. Participants will be encouraged to attend Hope and Healing at least twice per week and to engage in some type of physical activity at least four times per week for at least 30 min. Both peers and providers will offer regularly scheduled bi-weekly support groups at Hope and Healing. Finally, a quarterly newsletter containing up to date and interesting information about physical activity, self-change skills messages, and articles highlighting staff and participant successful change stories will be mailed. Monthly mail-back Activity Cards will be sent to participants for prompt logging of physical activity during the past week. While the content of the intervention conditions will be identical (e.g. facilitating participants learning self-regulatory skills posited in social cognitive theories), major intervention distinctions will be the credibility of the interventionist (‘peer’ or ‘provider’), rapport with the interventionist, and level and type of social support provided. These distinctions will be assessed by process measures. Specifically, interventionists will rate what type(s) of support they provided to participants. In addition, participants will rate credibility and rapport with their assigned interventionist.

Thus, our approach, while not specifically testing SAT (Ewart, 1991), should be viewed as potentially verifying its utility in the challenging enterprise of effecting sedentary behavior in inner-city America. We view the creation of the Hope and Healing Center as a major new ‘Action Context of Moderating Structures/Influences’ of the inner-city Memphis environment. Now available are

Fig. 2. Model of HOPE intervention effects.
significant opportunities for ‘Mediating the Self-Change Process’ in its pleasant, safe and comfortable atmosphere; we propose to compare the effectiveness of two different ‘Social Interaction Processes’ in facilitating exercise behavior change.

**Logic model of intervention effects**

In addition to specifying our theoretical framework and intervention domains, we have developed an implementation model that specifies the organization and evaluation of the intervention and links it with our desired outcomes. This implementation model is illustrated in Figure 2. In addition to using our SAT framework for translation of theoretical domains to intervention strategies, it also guided our measurements of primary physical and physiologic outcomes, intervention mediation, and moderating contexts and confounders. Additionally, multiple levels of assessment (e.g. environmental, personal, behavioral and social) were considered when selecting domains for measurement. The primary evaluation domains for HOPE and measures used to assess these domains are described below.

**Physical and physiological outcomes**

The primary outcome measure of this study is increased physical fitness. This increase in fitness will be assessed using the Rockport Fitness Walk Test, which is a well-validated measure of cardiorespiratory fitness (Kline et al., 1987; Laukkanen et al., 1992). We will measure reported physical activity using the Yale Physical Activity Survey, a well-validated and reliable self-report recall measure (DiPietro et al., 1993; Starling et al., 1999). Additionally, a modified Baecke questionnaire developed for ethnically diverse populations will be used to assess reported physical activity since this recall measure has an index targeting housework and childcare activities (Sternfeld et al., 1999). Secondary outcomes of interest for our study will be weight loss, improvements in blood pressure and improvement in biologic variables of glucose, HbA1c and plasma lipids, including total cholesterol, HDL-cholesterol, triglycerides and LDL-cholesterol.

**Intervention mediation**

Primary measures of intervention mediation will include participants’ ratings of their satisfaction with the intervention delivery. This domain is primarily being assessed by using the Health Care Climate Questionnaire (Williams et al., 1996). An existing assessment of social support for exercise (Sallis et al., 1987) has been modified to include ratings of support by peer/provider. Measures of decisional balance for physical activity (Marcus et al., 1992) and self-efficacy for barriers (Sallis, in preparation) to physical activity, and self-efficacy for physical activity performance (Sallis, in preparation) will also be scrutinized as potential mediators of behavior change. Finally, qualitative measures of personal strivings and goal setting have been designed for this study.

**Moderators and confounders**

Contextual influences will also be assessed to investigate potential effect modification and confounding of intervention outcomes. Primary moderators to be assessed include measures of psychological stress (Cohen et al., 1983), daily hassles (Romano et al., 1991), optimism (Scheier et al., 1994), depression (Radloff, 1977), spirituality and well-being (McBride et al., 1998), and, finally, environmental barriers to physical activity (Sallis et al., 1997).

Using SAT as our framework, we propose to investigate mediational relationships between intervention and change in physical activity. We will specifically address the following analytic questions: to what extent does our intervention influence behavior change and fitness?, to what extent does intervention influence change in mediating variables?, and to what extent are mediating variables predictive of behavior change and fitness? In general, in analytic models including intervention and mediating variables, as mediational explanation is maximized the relationship between intervention and behavior change is diminished. Support for our theoretical model will be measured as the extent to which this mediational explanation is maximized in our empirical analyses.
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Conclusions

Physical inactivity is not only an important contributor to many disease manifestations, it is a notoriously difficult behavior change to elicit and sustain. The HOPE intervention addresses the problem of sedentary behavior, a major contributor to ill health in urban-dwelling economically disadvantaged adults. While social support and provider counseling have been associated with increased physical activity in empirical studies, physical activity intervention trials have not specifically tested whether intentional, facility-based support can increase physical activity in a population with numerous barriers to engaging in regular exercise. The approach of this randomized trial is to test the effects of introducing two supportive models of behavior change. Specifically, these interventions include a safe, economical and faith-based environment to support increased physical activity, and to investigate manipulation of social interactions with peers and providers to increase motivation, problem-solving abilities and self-efficacy, and to reduce psychological distress and anxiety related to initiating and maintaining increases in physical activity. Thus, the results of this investigation have the potential to identify not only new mechanisms of behavior change, but to suggest potentially less costly peer interventions for dissemination to high-risk and underserved populations.

References


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Received on February 14, 2001; accepted on 21 November 2001