

The Intersection of Public Policy and Health Behavior Theory in the Physical Activity Arena

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Background: Policy strategies aimed at modifying aspects of the social, physical, economic, and educational environments have been proposed as potential solutions to the growing problem of physical inactivity. To develop effective physical activity policies in these and other areas, greater understanding of how and why policies successfully impact behavior change is needed. **Methods:** The current paper proposes a conceptual framework explaining how policy strategies map onto health behavior theoretical variables and processes thought to lead to physical activity change. This framework is used to make hypotheses about the potential effectiveness of different policy strategies. **Results:** Health behavior theories suggest that policies providing information may be particularly useful for individuals who are not yet considering or have only recently begun to consider becoming more physically active. Policies that provide opportunities may be less effective for individuals who do not find physical activity to be inherently fun and interesting. Policies that offer incentives or require the behavior may not be particularly useful at promoting long-term changes in physical activity. **Conclusion:** Exploring possible connections between policy strategies and theoretical constructs can help to clarify how each approach might work and for whom it may be the most appropriate to implement.

Keywords: exercise, walking, environment, psychological theories

Physical inactivity is a significant risk factor for numerous chronic diseases such as diabetes, cancer, and cardiovascular disease.¹ However, only half of U.S. adults achieve recommended levels of physical activity,² and 30% of adults reported no leisure time physical activity.³ Policy initiatives, which have been effective at combating a number of public health problems such as alcohol-related motor vehicle crashes and exposure to environmental smoke,⁴ are increasingly seen as a promising strategy to promote physical activity.⁵⁻⁸ Actions taken by government institutions through statutes, government regulations, and funded programs can create or modify physical, social, economic, and educational environments to encourage healthy behavior choices. For example, policies may subsidize transit passes, mandate school-based health curriculum, and change zoning regulations, building codes and street layout to increase physical activity.⁹⁻¹² Despite growing interest in this area, few studies have systematically compared the effectiveness of different policy strategies to influence physical activity behavior.^{13,14} Consequently, little is known about which

policy approach is the most appropriate and when it should be implemented.

Intrapersonal theories of health behavior change may provide a guiding framework for understanding the potential effects of different policies on physical activity. The Health Belief Model,^{15,16} the Theory of Reasoned Action/Theory of Planned Behavior,¹⁷⁻¹⁹ Social Cognitive Theory,^{20,21} Self-Determination Theory,^{22,23} the Transtheoretical Model²⁴ describe how and the extent to which psychological, social, and environmental factors predict health behavior²⁵⁻²⁷ (see Table 1). However, researchers have not considered how established health behavior theories can be used to make predictions about the effectiveness of different policy approaches to the promotion of physical activity. To address this gap, this paper discusses the extent to which different types of policy strategies map onto variables and processes specified by key health behavior theories. It then explains how this information can be used to make hypotheses and guide research on the potential effectiveness of each policy strategy.

Policy Strategies to Promote Physical Activity

For the purpose of this paper, policies to promote physical activity are categorized into 4 primary strategies used to influence behavior (see Table 2).

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Table 1 Intrapersonal Health Behavior Theories

Health behavior theory	Constructs/variables	Description/assumptions
Health Belief Model	Perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, self-efficacy	A person will take a health-related action if he/she feels at risk for a negative health outcome (ie, perceived susceptibility and severity), expects that by taking an action, he/she will prevent that negative health outcome (ie, perceived benefits), and believes that he/she can effectively take the action (ie, perceived barriers, self-efficacy).
Theory of Reasoned Action/Theory of Planned Behavior	Attitudes, subjective norms, behavioral control, behavioral intention	A person's intention to take action depends on his/her beliefs about the behavior weighted by evaluations of these beliefs (ie, attitudes), beliefs of other people about the behavior weighted by the value attributed to these opinions (ie, subjective norms), and his/her perceived ease or difficulty of taking that action (ie, perceived behavioral control). If a person intends to take an action, then it is likely that he/she will do it.
Social Cognitive Theory	Reciprocal determinism, environment, outcome expectancies, observational learning, reinforcement, self-efficacy	Reciprocal relationships exist between the environment, personal factors (eg, beliefs), and behavior. Beliefs (ie, outcome expectancies, self-efficacy) can influence actions, and vice versa. Beliefs are molded by structures within the social and physical environment. Behavior can influence one's environment, and is determined by that environment. These processes occur through observational learning and reinforcement.
Self-Determination Theory	External regulation, introjected regulation, identified regulation, integrated regulation, intrinsic motivation	Actions vary in the degree to which they are volitional, without any external influence. Motivation to take action occurs along a continuum from external regulation (ie, rewards, other's demands), followed by introjected regulation (ie, moral reasons), to identified regulation (ie, useful outcomes), to integrated regulation (ie, important for personal growth), to intrinsic motivation (ie, mastery, enjoyment).
Transtheoretical Model	Stages of change, processes of change	People progress through 5 stages of change on the way to permanently adopting a behavior: Precontemplation, Contemplation, Preparation, Action, Maintenance. Processes of change are activities that people use to move through the stages: consciousness raising (increasing awareness), dramatic relief (emotional arousal), environmental reevaluation (social reappraisal), social liberation (environmental opportunities), self reevaluation (self reappraisal), stimulus control (reengineering), helping relationship (supporting), counter conditioning (substituting), reinforcement management (rewarding), self liberation (committing).

Table 2 Policy Strategies to Promote Physical Activity

Policy strategy	Examples
1. Provide information about the behavior.	Point-of-decision stairway prompts, mass media campaigns, classroom-based curriculum.
2. Increase/decrease opportunities for behavior.	Improved access, availability, and proximity to facilities, resources, services, and programs; enhanced aesthetics; improved safety characteristics.
3. Offer incentives/disincentives for behavior.	Public transportation vouchers, lottery incentives for active commuting, tax deductions physical activity programs or supplies, reduced health insurance premiums.
4. Require/prohibit behavior.	Pedestrian-only streets, driving restrictions, parking regulations.

1. Provide Information About the Behavior. Policies can promote physical activity by providing information about the benefits and risks of health and unhealthy behaviors such as community-wide education and mass media campaigns^{28–31} (eg, CDC VERB campaign^{32,33}) and classroom-based physical activity curriculum.^{34–36}

2. Increase/Decrease Opportunities for Behavior. Another strategy that policies may use is to increase opportunities for physical activity or decrease opportunities for inactive behavior such as improved access, availability, and proximity to facilities, resources, services, and programs. Examples include the creation of safer routes to school,³⁷ improvements in street lighting,³⁸ the addition of bike lanes and planted trees,³⁹ and changes in school-based physical education programs.⁴⁰ These types of policies may also improve aesthetics and safety characteristics of environments for physical activity.⁴¹

3. Provide Incentives/Disincentives for Behavior. The provision of incentives or disincentives for behavior is another strategy through which policies can influence physical activity. These policies offer rewards and savings for engaging in active behaviors or impose fines and fees for engaging in inactive behaviors. In a recent paper, Pratt and colleagues¹² suggest a number of different ways that economic incentives can be used to promote physical activity such as taxing electronic sedentary equipment, tax credits for the purchase of health club membership, increasing the gas tax, and parking cash outs (ie, employees given cash value of parking space). Interventions based upon this strategy have also distributed transportation passes to employees⁴² and offered lottery incentives for activity.⁴³

4. Require/Prohibit Behavior. Physical activity policies may also require active behaviors or prohibit inactive behaviors through regulations, requirements, restrictions, and prohibitions enforced through government-agencies and the courts. Some examples of environmental modification resulting from this type of policy include streets with limited car access, parking regulations, and skateboarding restrictions. Empirical studies examining the effects of this type of policy enactment on physical activity are limited. However, examples of policies that successfully require/prohibit behaviors are evident in the

area of tobacco control (eg, indoor smoking restrictions, age requirements for the purchase of tobacco).^{44–46}

Proposed Relationships Between Policy Strategies and Theoretical Constructs

To date, there is little research about which type of policy strategy is the most effective approach for increasing physical activity at the population level. However, considering the variables proposed by intrapersonal health behavior theories (see Table 1) can make the selection of the right policy for a given population and setting more likely and may save time and money in the long run. To better understand which policy strategy will the most effective and when it should be implemented, it may be helpful to consider the intervening theoretical processes that link the policy to behavior. To address this gap, this paper discusses the extent to which each of the 4 outlined physical activity policy strategies map onto theoretical components. Figure 1 shows a proposed conceptual model connecting policy strategies, theoretical constructs, and physical activity. The following sections will further elaborate on this model by describing hypothesized linkages between each policy strategy and specific theoretical variables.

Provide Information About the Behavior

Policies that seek to promote physical activity by providing health information rely heavily on cognitive and motivational processes such as attitude and belief change (see Table 3). Community-wide media campaigns consisting of billboard, newspaper, radio, and poster advertisements have been shown to influence perceived benefits (ie, outcomes of walking)⁴⁷ and perceived susceptibility (ie, concerns about cardiovascular health),⁴⁸ which are important components of the Health Belief Model and Social Cognitive Theory (see Table 1). Likewise, mass media campaigns have been found to affect Theory of Reasoned Action/Theory of Planned Behavior constructs such as attitudes^{49,50} and intentions to engage in physical activity⁵¹ (see Table 1). Policies that provide information about the health benefits of physical activity may tap into underlying needs for personal growth and self-improvement, which can be seen as a form of internally-oriented

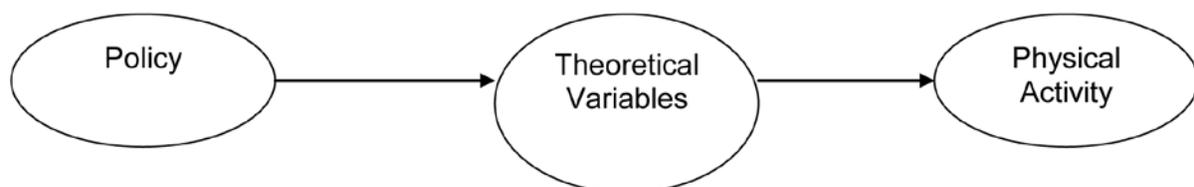


Figure 1 — Proposed linkages between policy, theoretical variables, and physical activity.

Table 3 Proposed Relationships Between Policy Strategies for Promoting Physical Activity and Health Behavior Theoretical Variables

Health behavior theory	Policy strategy			
	Provide information about the behavior	Increase/decrease opportunities for the behavior	Offer incentives or disincentives for the behavior	Require/prohibit the behavior
Health Belief Model	Perceived susceptibility, perceived severity, perceived benefits	Perceived barriers, cues to action	Perceived benefits, cues to action	None
Theory of Reasoned Action /Theory of Planned Behavior	Attitudes toward the behavior, outcome expectancies	Social norms, perceived behavioral control	Attitudes toward the behavior, outcome expectancies	None
Social Cognitive Theory	Outcome expectancies	Environment, social modeling, self-efficacy	Outcome expectancies, reinforcement	Reciprocal determinism
Self-Determination Theory	Integrated regulation	Intrinsic regulation	External regulation	External regulation, introjected regulation
Transtheoretical Model	“Consciousness raising”—Precontemplation to Contemplation	“Stimulus control”—Preparation to Action and Maintenance	“Reinforcement management”—Action to Maintenance	“Social liberation”—Maintenance

motivation for behavior change (eg, introjected motivation) according to Self-Determination Theory (see Table 1). In addition, policies that provide information about the behavior can be thought of as a form of consciousness raising, a process of change that involves increasing knowledge and awareness, which according to the Transtheoretical Model is thought to stimulate movement between the earlier stages of change,⁵² particularly from precontemplation to contemplation (see Table 1). Overall, research showing that beliefs, attitudes, and motives are predictive of physical activity^{53,54} offers support for potential effectiveness of information-based policies to change physical activity patterns.

Increase/Decrease Opportunities for Behavior

Policies can increase opportunities for physical activity by modifying environmental and contextual factors, which in turn, may influence perceived barriers, self-efficacy, social norms, intrinsic motivation, and stimulus control (see Table 3). Creating opportunities for physical activity can reduce perceived barriers to behavior, which is an important component of the Health Belief Model⁵⁵ (see Table 1). In addition, according to Social Cognitive Theory, overcoming situational barriers may positively impact self-efficacy.²¹ For example, research has shown that increased opportunities for school-based physical activity can enhance self-efficacy among youth.^{56,57} Poli-

cies that provide opportunities for physical activity may influence social norms, which maps onto the Theory of Planned Behavior (see Table 1). Environmental changes such as building a bike trail may influence an individual's thinking that physical activity is becoming normative, acceptable and even desirable. Further, increasing opportunities for physical activity can augment one's enjoyment of that behavior—a form of internal motivation (ie, intrinsic motivation) described by Self-Determination Theory (see Table 1). For example, developing a park or multiuse trail in a natural area that is rich in vegetation and wildlife can make physical activity more pleasant and fun for those who use that facility or attract new people who enjoy these features.^{58,59} Lastly, policies that increase opportunities for physical activity can serve as “stimulus controls” (according to the Transtheoretical Model) because they restructure the environment so that people interact with stimuli that encourage active behaviors (eg, parks, recreational facilities).⁵² The Transtheoretical Model suggests that stimulus controls influence progression between the later stages of change, particularly from the action to maintenance stages⁵² (see Table 1). In summary, there is substantial theoretical support for the potential effectiveness of policies that increase opportunities for physical activity.

Provide Incentives/Disincentives for Behavior. Health behavior theories describe how policies providing incentives or disincentives may be used to change physical activity behavior. Self-Determination Theory

suggests that offering rewards or punishments for behavior triggers externally-oriented motivation (ie, external regulation; see Table 1). Although external rewards may induce change for simple behaviors such as seat belt use,⁶⁰ less evidence exists for their capacity to promote long-term behavior change, and they are believed to undermine intrinsic motivation (eg, fun and enjoyment).⁶¹ When considering this policy strategy in light of the Transtheoretical Model's processes of change, providing incentives for behavior change could be considered a form of "reinforcement management." Rewards for the physical activity are received after the behavior has already been initiated and hence they are expected to be the most helpful in stimulating progress from the action to the maintenance stage⁵² (see Table 1). Furthermore, policies that provide incentives are likely to change expected outcomes, perceived benefits and attitudes toward the behavior, which are elements of the Health Belief Model, Theory of Reasoned Action, Theory of Planned Behavior, and Social Cognitive Theory. However, they are unlikely to influence behavior alone, without the other important constructs in those models being affected.

Require/Prohibit the Behavior. Health behavior theories also describe possible mechanisms through which policies that require or prohibit behavior may promote physical activity (see Table 3). According to Self-Determination Theory, strategies that restrict behavioral choice represent external and introjected forms of regulation (see Table 1). For example, policies may increase levels of walking by banning the use of motorized vehicles in certain settings (eg, college campuses, shopping malls, places of employment). The motivation for physical activity on pedestrian-only streets is based on the desire to comply with external forces (ie, rules and requirements) and avoid negative repercussions. While pedestrian-only streets may eliminate behavioral options, other rule-based policies to promote physical activity may merely constrain them. For example, if parking at a workplace or school is limited, people can choose to walk, bicycle, or ride public transit as an alternative. In these situations, external motivation still plays a role by initially restricting behavioral options, however, these policies require a new set of decisions that may be guided by a variety of other psychosocial processes (eg, behavioral enjoyment, monetary incentives, etc). In terms of the Transtheoretical Model's processes of change, policies that require/prohibit behaviors could be considered a form of "social liberation" because they increase opportunities for the targeted health behavior in society.⁵² These policies might be most widely accepted among individuals who have already progressed into the maintenance stage⁵² and consequently, tend to look favorably upon society's actions to further support their behavior. For individuals in the earlier stages of change, policies that require active behaviors in certain settings could have negative consequences. For example, individuals who encounter situations that require more walking than expected could experience pain or injury from improper footwear and

carrying heavy loads (eg, shopping bags, backpacks). In addition, reactance could occur. Individuals who are frequently required to walk in one setting (eg, university campus) may be less compelled to engage in volitional physical activity in other settings (eg, gym/health club) due to fatigue and the generation of negative attitudes toward the behavior. Further, people may have limits on the time they budget to overall physical activity. Time spent in required walking may reduce the time available for leisure-time physical activity. Policies that require or prohibit behavior map onto Social Cognitive Theory in the general sense of reciprocal determinism.²⁰ The environment interacts with and shapes the options at the personal and behavioral levels. Policies that require or prohibit behaviors to promote physical activity do not closely adhere to the constructs proposed by other intrapersonal health behavior theories such as the Health Belief Model, Theory of Reasoned Action, and Theory of Planned Behavior.

Summary and Discussion

Exploring possible connections between policy strategies and theoretical constructs can help to clarify how each approach might work and for whom it may be the most appropriate to implement. The sizable body of research showing that changing attitudes and beliefs predict behavior^{53,54} provides support for potential effectiveness of information-based policies (eg, point-of-decision prompts, school-based curriculum) to promote physical activity. The processes of change component of the Transtheoretical model suggests that policies that provide information may be particularly useful for individuals who are not yet considering or have only recently begun to consider becoming more physically active. Policies that seek to promote physical activity by providing opportunities (eg, facilities, programs, equipment) for the behavior rely heavily upon intrinsic motivation to be active in those settings, and therefore may be less useful for individuals who do not find physical activity to be inherently fun and interesting. Policies that provide opportunities may also be especially effective for individuals who have recently adopted a regular physical activity routine, and are searching for methods of maintaining this behavior over time. On the other hand, policies that offer incentives or require the behavior do not involve many psychosocial processes other than external motivation and therefore, may not be particularly useful at promoting long-term changes in physical activity unless they are pervasive (eg, implemented across multiple settings) and permanent.

Recommendations for Research and Policy

Identifying key theoretical constructs influenced by a policy can inform the public policy selection and formation process (ie, decisions among a set of competing policies that are being considered). For example, theory suggests that policies that provide incentives may not

sustain behavior change. Therefore, policies that offer monetary benefits may not be the best choice when long-term maintenance of behavior change is desired. Furthermore, intrapersonal health behavior theories can enlighten policy-makers about when policies should target population subgroups. For example, policies mapping onto processes of change specified by the Trans-theoretical Model (eg, consciousness raising, stimulus control) can have differential effectiveness depending on whether the population subgroup has considered or attempted behavior change. The health behavior theories considered in this paper focus primarily on individual level behavior change. It is possible that policies also influence collective action,^{62,63} which can in turn, influence individual behavior and/or the passage of additional policies in this area. Collective action theory adds to the complexity in understanding the impact of social policies on health behavior and vice versa. Overall, the goal of current paper was to initiate a discussion on we can use health behavior theory to guide research and decisions in the physical activity policy arena. As such, it is intended to serve as a launching point for future work on this topic.

Conclusions

A systematic examination of the intersection between public policy and health behavior theory in the physical activity arena suggests that the implementation of a single policy strategy may be insufficient on its own to produce sustained behavior change. Instead, it may be necessary to simultaneously execute policies that offer opportunities for physical activity with those that provide information. In that way, individuals can be aware of the benefits of using the facilities and resources that are available. Lastly, policies that offer incentives or require behavior may not provide the best solution for producing lasting behavior change among inactive individuals. However, they may be helpful for reinforcing and supporting physical activity among individuals who have recently adopted the behavior or are working to maintain an active lifestyle.

Acknowledgments

The first author was supported by the Cancer Prevention Fellowship Program, Office of Preventive Oncology, National Cancer Institute, National Institutes of Health during the preparation of this paper.

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