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Developing Behavioral Theory With the Systematic Integration of Community Social Capital Concepts

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Abstract

Health behavior theories state that social environments influence health behaviors, but theories of *how* this occurs are relatively underdeveloped. This article systematically surveys community social capital concepts in health behavior literature and proposes a conceptual framework that integrates these concepts into existing behavioral theory. Fifty-three studies tested associations between community social capital concepts and physical activity (38 studies), smoking (19 studies), and diet (2 studies). Trustworthiness of community members was consistently associated with more health-promoting and less disease-promoting behaviors in 19 studies. Neighborly reciprocity showed mixed results in 10 studies. Reporting a good sense of community was associated with more physical activity in only 5 of 16 studies. Neighborhood collective efficacy, which includes social cohesion and informal social control, was inconsistently associated with behaviors in 22 studies. Behavioral social norms were associated with smoking and physical activity in 2 of 6 studies, and neighborhood modeling of physical activity was associated with increased activity in 12 of 17 studies, with 1 opposing result. This review identifies several community social capital–related concepts that are, at times, associated with both health-promoting and disease-promoting behaviors and often have no associations. Theory explains these findings by describing the relationships and interactions among these concepts. Using these findings, this article proposes a conceptual framework that integrates community social capital concepts into existing behavioral theory. Iterative empirically based theory development is needed to address these concepts, which affect behaviors. These results can also inform theoretically based community-based and socially tailored interventions.

Keywords

community; health behavior; neighborhood; social capital; social cohesion; social determinants; trust

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Supplemental Material

The online appendix is available at heb.sagepub.com/supplemental.

Health behavior theories state that social environments influence health behaviors, but theories of *how* this occurs are relatively underdeveloped. As examples, behavioral theorists and interventionists use numerous individual-level constructs such as attitudes, intentions, and self-efficacy (McAlister, Perry, & Parcel, 2008; Montaña & Kasprzyk, 2008), but few social-level constructs, such as collective efficacy (McAlister et al., 2008). A PubMed search produced 27,636 results for self-efficacy but only 161 for collective efficacy. Also, theories, such as social cognitive theory and theory of planned behavior, presume that behavior change is predicated largely by individual cognitive processes (Bandura, 1989; Montaña & Kasprzyk, 2008), ignoring social forces, such as socialization to group norms, which act via noncognitive pathways (Ryder, 1965; Singh-Manoux & Marmot, 2005). Such limitations have prompted a call for greater integration of social constructs and pathways in behavioral theories and interventions (Burke, Joseph, Pasick, & Barker, 2009; Glass & McAtee, 2006).

Community social capital, one aspect of social environment that is gaining attention, is a multidimensional construct that has been defined and operationalized in numerous different ways (discussions of this can be found in Brunie, 2009; Hawe & Shiell, 2000; Lochner, Kawachi, & Kennedy, 1999; Macinko & Starfield, 2001; Wilkinson, 2007). This article will rely on definitions of Bourdieu (1986) and Coleman (1988), who both understand social capital to be resources in social networks that are useful for an individual to enact behaviors. These conceptualizations highlight the function of social networks, rather than size or other structural characteristics (Bourdieu, 1986; Coleman, 1988; Kawachi & Berkman, 2000). Social capital varies by setting but may include access to information or behavioral norms, freedom to trust other group members, or ability to expect supportive help from others (Coleman, 1988; Portes, 1998). Availability of social capital depends on the social cohesion (Bourdieu, 1986) and collective efficacy (Bandura, 2000; Sampson, Raudenbush, & Earls, 1997) of the group, which help the group achieve common goals, and social capital and social cohesion are often used interchangeably. Therefore, social capital is best understood in relation to these other concepts.

A growing body of evidence has established a relationship between community social capital and health behaviors. A handful of physical activity studies were described in reviews of community environments (McNeill, Kreuter, & Subramanian, 2006; Wendel-Vos, Droomers, Kremers, Brug, & van Lenthe, 2007), but there has been no systematic survey of the numerous operationalizations of community social capital. Also, although community social capital may, theoretically, contribute to both health-promoting behaviors, such as physical activity, fruit and vegetable consumption, and smoking cessation, *and* disease-promoting behaviors, such as smoking (Carpiano, 2006; Moore, Daniel, Gauvin, & Dube, 2009; Portes, 1998), there has been no summary of results. Additionally, empirical findings can be situated within a wealth of theoretical literature from sociology and social epidemiology that can inform integration of these concepts into existing behavioral theories. This integrated knowledge will expand our understanding of *how* community social capital influences health behaviors and can be used to socially tailor community-based interventions.

Purpose

The purposes of this article are to (a) systematically survey the empirical use of community social capital concepts to identify and define concepts related to health behaviors and (b) propose a testable conceptual framework that integrates the concepts into existing behavioral theory based on both empirical and theoretical literature.

Method

A systematic literature search without date restriction was conducted with librarian consultation in PubMed, Web of Knowledge, PsychInfo, Sociological Abstracts, CINAHL, and Scopus in April 2011. Peer-reviewed studies published in English reporting summary statistic(s) for the relationship between specific neighborhood or community social capital concept(s) and health-promoting behavior (smoking cessation, engaging in physical activity, and consuming a healthy diet) or disease-promoting behavior (smoking status and smoking initiation) were included in the review, and postintervention results were excluded. Search terms included concepts that are used interchangeably with social capital, or closely related concepts. Studies defining social capital according to structure of social networks, rather than the function of networks, or as a multidimensional concept, were excluded from review. See the appendix for details. Empirically used concepts were identified, and results were categorized by operational definitions and abstracted accordingly, based on consensus from two authors (LS, YCM). Operational definitions, based on instruments in empirical studies, were matched with theoretical definitions from theoretical literature. Then, theoretical literature was used to derive a conceptual framework.

Results

Sixty-two articles from 53 studies were identified. All but 11 studies (Evenson, Sarmiento, Tawney, Macon, & Ammerman, 2003; Fisher, Li, Michael, & Cleveland, 2004; Hume, Jorna, et al., 2009; F. Li, Fisher, & Brownson, 2005; Loucaides, 2009; Lundborg, 2005; Mota, Almeida, Santos, & Ribeiro, 2005; Rohm & Voorhees, 2003; Thompson, Wolfe, Wilson, Pardilla, & Perez, 2003; Voorhees & Rohm, 2003; Wilbur, Chandler, Dancy, & Lee, 2003a, 2003b) used random sampling, and all but 6 studies (Cleland, Timperio, & Crawford, 2008; Craddock, Kawachi, Colditz, Gortmaker, & Buka, 2009; Ennett et al., 2010; Giordano & Lindstrom, 2011; Hume, Timperio, et al., 2009; F. Li et al., 2005; Pabayo, Belsky, Gauvin, & Curtis, 2010) were cross-sectional. Although the majority of studies were conducted in urban settings and in the United States, no notable pattern in results emerged according to rural versus urban differences or across the 13 countries.

Studies examined relationships between community social capital concepts and physical activity (38 studies), smoking behaviors (19 studies), and fruit and vegetable intake (2 studies; Tables 1 and 2). Six studies presented only crude associations (Lindstrom, 2009; Loucaides, 2009; Rohm & Voorhees, 2003; Thompson et al., 2003; Wilbur et al., 2003a, 2003b), but the rest adjusted for individual sociodemographic characteristics and/or health status, and most adjusted for neighborhood characteristics, such as socioeconomic status, safety, or presence of stores or parks. Notably, community social capital concepts were

associated with decreased health-promoting or increased disease-promoting behaviors in several population-based samples, including U.S. adolescents (Kim, Liu, Colabianchi, & Pate, 2010; Musick, Seltzer, & Schwartz, 2008), Taiwanese adults (Chuang & Chuang, 2008), Dutch older adults (Kamphuis et al., 2009), and a predominately Hispanic female sample (Carpiano, 2007, 2008; Kim et al., 2010).

Figure 1 demonstrates community social capital concepts identified in the literature, extending an existing model of theory of planned behavior (Montaño & Kasprzyk, 2008). This conceptual framework is one example of integrating these concepts into existing behavioral theory, although other approaches could be accomplished. Based on theory, Figure 1 presents community social capital concepts at a community level (Bourdieu, 1986; Coleman, 1988; Kawachi & Berkman, 2000; Szreter & Woolcock, 2004). Twenty-five reviewed studies statistically accounted for potential clustering of community social capital values, as shown in Tables 1 and 2. As the tables show, some of them were able to detect differences in inferences, when comparing individual social capital responses to aggregated mean responses, supporting the theoretical proposition that social capital exists at the community level (Bourdieu, 1986; Coleman, 1988).

The conceptual model proposes that components of community social capital, such as trustworthiness, neighborly reciprocity, and sense of community, operate via two main pathways to affect behavior. First, it is thought to provide access to social support, (Chaix, 2009; Kawachi & Berkman, 2000; Portes, 1998), which influences behaviors via cognitive factors such as self-efficacy (Berkman & Glass, 2000; Heaney & Isreal, 2008; House, Umberson, & Landis, 1988). Since social support and individual-level factors are well addressed elsewhere (Ajzen, 1991; Bandura, 1977; McAlister et al., 2008; Montaño & Kasprzyk, 2008), this article will not elaborate on this pathway. Only one reviewed study supported this pathway, showing that the combined effect of self-efficacy, outcome expectancies, intentions, and physical activity enjoyment and skills accounted for some of the association between social cohesion and social control with physical activity (Cleland et al., 2010). However, several studies adjusted for either self-efficacy (Deforche, Van Dyck, Verloigne, & De Bourdeaudhuij, 2010; Fisher et al., 2004; Y. J. Li et al., 2005) or social support (Poortinga, 2006a; Poortinga, 2006b), and some found associations (Tables 1 and 2), suggesting that this mechanism is not the sole pathway between community social capital and health behaviors.

A second theorized pathway between community social capital and health behaviors is socialization (Chaix, 2009; Portes, 1998), a process in which individuals adapt their behaviors to align with the norms of their community social networks (Ryder, 1965; Singh-Manoux & Marmot, 2005). Socialization cannot be assumed to operate via cognitive pathways that characterize existing behavioral theories (Burke et al., 2009), so Figure 1 proposes a separate pathway. However, despite the premise that socialization has greatest influence on individuals who self-identify as social network members, relatively few reviewed studies controlled for individual's integration in community social networks (Afifi, Nakkash, & Khawaja, 2010; Ahern, Galea, Hubbard, & Syme, 2009; Ball, Cleland, et al., 2010; Carpiano, 2007, 2008; Chuang & Chuang, 2008; Deforche et al., 2010; Echeverria, Diez-Roux, Shea, Borrell, & Jackson, 2008; Giordano & Lindstrom, 2011; Hume, Jorna, et

al., 2009; Kim et al., 2010; Mendes de Leon et al., 2009; Morgan & Haglund, 2009; Pabayo et al., 2010; Poortinga, 2006a, 2006b; Siahpush et al., 2006; Wood, Frank, & Giles-Corti, 2010). One of the few theoretically based studies found that such integration modified the relationship between social capital and smoking (Carpiano, 2008), indicating that studies should address individual community integration.

Trustworthiness

Trustworthiness undergirds all relationships. In communities, the ability to trust neighbors fosters a free exchange of resources (Coleman, 1988; Portes, 1998) and improves collective efficacy (Kawachi & Berkman, 2000; Figure 1). As an important caveat, theory suggests that group homogeneity and/or shared history (Szreter & Woolcock, 2004) and frequent interaction (Y. J. Li, Pickles, & Savage, 2005) are necessary ingredients for trustworthiness, and this may be lacking in communities with residential instability or segregation. Only six studies measuring trustworthiness addressed participant's integration (Afifi et al., 2010; Ball, Cleland, et al., 2010; Chuang & Chuang, 2008; Giordano & Lindstrom, 2011; Morgan & Haglund, 2009; Poortinga, 2006b), and none addressed historical or sociopolitical contexts.

Trustworthiness was generally associated with increased health-promoting behaviors and decreased disease-promoting behaviors in 19 studies (Tables 1 and 2), although a Taiwanese study found statistically significant results among women only (Chuang & Chuang, 2008). However, measurement was generally weak. Ten studies simply asked if people in the neighborhood could be trusted, 7 asked if people in general could be trusted (Ball, Cleland, et al., 2010; Giordano & Lindstrom, 2011; Lindstrom, 2003, 2009; Lundborg, 2005; Poortinga, 2006a, 2006b), and 2 combined questions about whether neighbors could be trusted and relied on for help (Duke, Borowsky, & Pettingell, 2010; Morgan & Haglund, 2009).

Neighborhood Reciprocity

Neighborhoods vary according to the level of help and support that is expected for members to provide to each other. This concept, neighborhood reciprocity, should, theoretically, allow individuals to expect social support (Bourdieu, 1986; House et al., 1988; Figure 1). Neighborhood reciprocity was measured by 10 studies, usually with only one or two questions, (i.e., willingness to help each other and/or look out for each other), which were specific to neighbors in all but one study (Ball, Cleland, et al., 2010). Two studies measured reciprocity with either four (Duke et al., 2010) or five (Sapag et al., 2010) questions, and one study only asked if neighbors would help maintain walking trails (Deshpande, Baker, Lovegreen, & Brownson, 2005). Results show generally either a null or a positive association with health-promoting behaviors and negative association with disease-promoting behaviors (Tables 1 and 2), although in one predominately Hispanic female sample, neighborhood reciprocity was associated with *increased* smoking (Carpiano, 2007, 2008; Table 2).

Sense of Community

Sense of community is less strictly defined than other social capital concepts but is thought to represent a caring commitment of community members, which gives neighbors a sense of

belonging (McMillan & Chavis, 1986) and group identity (Bourdieu, 1986). Sense of community should, therefore, be linked with social support (Heaney & Isreal, 2008; Figure 1). Also, individuals who feel like they belong to a community are likely to adhere to the community's behavioral norms, even if they promote disease, such as encouraging social smoking or excessive drinking (Etzioni, 2000), so a second pathway is proposed via socialization leading to health behaviors (Figure 1).

Sixteen studies sought to determine if individuals perceiving their neighborhoods to have a good sense of community engage in more health-promoting behaviors. A pattern emerged in physical activity results (Table 1), according to the operationalization of sense of community. Four studies simply queried if the neighborhood is a good place to live (Deshpande et al., 2005; Greiner, Li, Kawachi, Hunt, & Ahluwalia, 2004; Hume, Timperio, et al., 2009; Poortinga, 2006b), and three studies added two to five questions about attachment and commitment to people in the neighborhood (Deforche et al., 2010; du Toit, Cerin, Leslie, & Owen, 2007; Wood et al., 2010). These all generally found positive associations with physical activity. One study examined individuals' sense of belonging to their community, rather than perception of the community itself, which was associated with sports activity overall, but not with walking, in a subsample of older adults (Kamphuis et al., 2008, 2009). The remainder of the studies used yet another instrument, which queried if the neighborhood is a good place to live and if neighbors and law enforcement could be counted on for help, which was not significantly associated with physical activity.

Community Collective Efficacy (Social Control and Social Cohesion)

Collective efficacy is a concept used in social cognitive theory to describe a groups' ability to achieve goals (Bandura, 2000; McAlister et al., 2008), and is related to, but separate from, social capital (Kawachi & Berkman, 2000), so it is represented as a different box in Figure 1. Neighborhood collective efficacy is a combination of social cohesion, or solidarity among neighbors to establish common goals, and informal social control, or the willingness of neighbors to intervene for the common good and leverage relationships to pursue common goals (Kawachi & Berkman, 2000; Sampson et al., 1997). Collective efficacy is fostered by long-term trusting relationships built on reciprocal help and positive interactions (Sampson et al., 1997), and social cohesion of the community facilitates access to social capital (Bourdieu, 1986), so the framework in Figure 1 proposes that social capital predicates community collective efficacy.

Collective efficacy likely influences health behaviors through several mechanisms. Neighborhood social cohesion provides access to social support (Berkman & Glass, 2000; Heaney & Isreal, 2008). Also, socialization requires a cohesive social network that has informal control over member's behaviors (Etzioni, 2000; Singh-Manoux & Marmot, 2005), and social control can impose informal sanctions, such as isolation, on individuals who stray from community network normative behaviors (Etzioni, 2000; Sunstein, 1996) even if they are disease-promoting behaviors (House et al., 1988). Therefore, Figure 1 proposes that socialization arises from collective efficacy. Indeed, one reviewed study found no association between smoking norms and smoking overall, but adolescents were less likely to smoke if adults disapproved only in neighborhoods with high social control (Musick et al.,

2008), suggesting that enforcement of norms depends on social control in the community. In addition, collective efficacy facilitates collective action (Bandura, 2000; Sampson et al., 1997) and may indirectly increase health-promoting behaviors through coordinated actions that promote health (Kawachi & Berkman, 2000; Uchino, 2004). For example, neighbors may work together to make streets safe for walking, take political action to regulate tobacco sales, or organize a farmers' market to ensure access to produce, which could produce community-level behavior change. Although there is evidence elsewhere of behavior change across social groups (Christakis & Fowler, 2007, 2008), only one reviewed study assessed behavior prevalence (Chen et al., 2010).

Two studies examined collective efficacy, another 17 studies examined social cohesion, and 5 studies examined social control (Tables 1 and 2). Most studies used a common instrument for neighborhood collective efficacy, which has social cohesion and informal social control subscales (Sampson et al., 1997). The social cohesion questionnaire asks if the neighborhood is close-knit and if neighbors get along together, share the same values, and are trustworthy and helpful. The social control questions focus on whether adults in the neighborhood would intervene in various situations, focusing on children's disruptive behavior.

The results for both social control and social cohesion were not consistent, and the direction of association may differ for neighborhood aggregated mean scores than for individual responses for social control (Kim et al., 2010) and social cohesion (Chuang & Chuang, 2008; Tables 1 and 2). Interestingly, in a Taiwanese sample, where over half of men smoked, social cohesion was positively associated with smoking (Chuang & Chuang, 2008). Also, in a predominately Hispanic female sample, community integration modified the effect of social control on smoking, so in neighborhoods with low social control, integration was associated with increased odds of smoking, whereas the opposite was true in neighborhoods with high social control (Carpiano, 2008), indicating that the effect of social control may depend on how an individual interacts with his or her environment. Several studies tested for interactions between sex and either social cohesion (Hume, Jorna, et al., 2009; Pabayo et al., 2010) or social control (Kim et al., 2010), but only one physical activity outcome showed a stronger association among males (Pabayo et al., 2010), indicating that these inconsistent results are not attributable to gender. However, one study found an interaction between neighborhood collective efficacy and smoking norms, so that collective efficacy was associated with decreased likelihood of smoking if neighborhoods were perceived as antismoking but increased likelihood of smoking if neighborhoods were perceived as prosmoking (Ahern et al., 2009).

Behavioral Norms

Social norms supporting particular behaviors strongly influence an individual's health behavior by shaping attitudes via socialization (Berkman & Glass, 2000; Etzioni, 2000; Figure 1). Empirical results suggest that behavioral norms influence health behaviors via socialization pathways rather than social support pathways, since neither self-efficacy (Thompson et al., 2003) nor support for activity (Ball, Jeffery, Abbott, McNaughton, & Crawford, 2010) mediated the relationship between behavioral norms and physical activity

in reviewed studies. Since behavioral norms are actually the messages transmitted by social capital, rather than social capital itself, they are shown as arrows. Six studies examined the relationship between behavioral norms and either physical activity or smoking using different operational definitions (Table 3).

Modeling of health behaviors is a key concept in social cognitive theory, since observing a peer modeling a behavior may influence an individual's behavior (McAlister et al., 2008). Community modeling could be a proxy for behavioral norms because it indicates social acceptability of the behavior (Chaix, 2009). Community modeling was measured in 17 studies by simply asking respondents if other people in their neighborhood walked, were physically active, or smoked, except for one study that asked several questions about smoking behaviors (Ennett et al., 2010). As Table 3 demonstrates, modeling was generally associated with increased likelihood of engaging in the behavior. Surprisingly, in one urban Hispanic female sample, women were *less* likely to be physically active if they saw neighbors being active (Voorhees & Rohm, 2003). This was not corroborated in similar Hispanic female samples (Evenson et al., 2003; Wilbur et al., 2003b).

Discussion

This review contributes to the literature by identifying community social capital concepts used in empirical studies, including trustworthiness, neighborly reciprocity, and sense of community. These results provide unique empirical evidence to support previously theorized relationships between community social capital concepts and health behaviors, showing that social capital, collective efficacy, and behavioral norms are associated, at times, with both health-promoting and disease-promoting behaviors, though many studies had null findings. This review also found that many studies could be strengthened by theoretical grounding. This article contributes by proposing that community social capital concepts be integrated into existing behavioral theory and by providing a testable conceptual framework to address this gap.

The seemingly inconsistent associations between community social capital and collective efficacy concepts with health behaviors do not appear to be attributable to study setting, since community social capital concepts were associated with adverse health behaviors in several large population-based samples (Carpiano, 2007; Chuang & Chuang, 2008; Kamphuis et al., 2009; Kim et al., 2010; Musick et al., 2008). However, it is interesting to note that all but one of these studies (Chuang & Chuang, 2008) were conducted in samples who may not necessarily identify with the dominant community social culture, including Hispanic females, older adults, and adolescents. Similarly, some concepts in this review were significantly associated with health behaviors in Whites, but not minorities, in stratified analyses. Although this may be attributable to reduced power, this may actually represent differential effect of community social capital for certain subgroups. Certainly, subcultures socialize differently from the dominant community culture, and null results may mask subgroup differences. Theory suggests that results may differ for marginalized subgroups, who are excluded from socialization (Portes, 1998). This review found that many studies failed to control for individuals' integration into their community group, which may affect the findings. Community social capital is more accessible to individuals who interact

with neighbors (Bourdieu, 1986), and only individuals who self-identify as members of a community social network will be socialized to the community's behavioral norms (Etzioni, 2000). Future studies should consider an individual's integration into community social networks.

Alternatively, behavioral norms may differ across subgroups, altering the association between social capital or collective efficacy and health behaviors. In reviewed studies, behavioral norms were associated with behaviors, even if they promote disease, and two reviewed studies showed that behavioral norms interact with collective efficacy concepts. Theories suggest that social cohesion provides access to behavioral norms and that informal social control enforces adherence to those norms (Kawachi & Berkman, 2000; Sampson et al., 1997). Thus, it is plausible that enhanced community collective efficacy could actually increase disease-promoting behaviors if the behavioral norms of communities promote those behaviors. However, this systematic review identified only a handful of studies that measured behavioral norms, other than modeling. This shows a gap in knowledge of both normative community contexts and the seemingly multiple pathways between norms and health.

Another potential reason for the apparently weak associations between social capital concepts and health behaviors is measurement error. Others have discussed measurement limitations of neighborhood-level latent constructs (Diez Roux, 2004; Harpham, Grant, & Thomas, 2002; Raudenbush & Sampson, 1999). This review found that the concepts of trustworthiness, neighborly reciprocity, and modeling relied on only one or two questions, which likely induces measurement error and bias. Also, some instruments for sense of community distinguished an effect, whereas other instruments did not. Furthermore, all but one study relied on self-reported behavior as a measure of behavioral norms (Hoehner, Brennan Ramirez, Elliott, Handy, & Brownson, 2005), but objective measurement methods are generally preferable.

Overall, these results suggest that a major limitation of existing literature is the lack of theoretical grounding. For example, studies have ignored theoretically potentially confounding factors, such as community social network characteristics, or individual's integration into community networks, which may explain null findings. Also, weak and inconsistent empirical findings may be due to mediating effects of behavioral norms, as suggested by the conceptual model presented here. In addition, these results are all observational. Little intervention research addresses community social capital and no studies have tested social capital theories or theoretically plausible pathways between social capital and behaviors. Testing of conceptual models, such as the one presented here, is needed.

Although random sampling strategies and diverse samples improves generalizability of these results, limitations of design and methods also exist in reviewed studies. The majority of studies were conducted in the United States, and findings may differ in other countries depending on political, socioeconomic, historical, or cultural factors. Also, many studies excluded participants who recently moved. Although this may reduce measurement error, it increases susceptibility to selection bias, especially since individuals of lower socioeconomic status, who tend to have housing instability, likely have different experiences

with their neighborhood than wealthier, stable individuals. In addition, the preponderance of cross-sectional data limits causal conclusions. Also, many of the reviewed studies did not account for community-level clustering, limiting understanding of community-level influence of social capital, collective efficacy, and behavioral norms.

These limitations and inconsistent results found in this review highlight the need for iterative theory development. Empirical results and theory from social sciences should inform behavioral theories. Likewise, observational and intervention research should be theoretically based. The conceptual framework in this article is a novel approach to integrating social capital concepts into behavioral theory, but it requires validation. It provides a testable framework, based on theoretically plausible associations, and is supported by the limited empirical evidence available to date. Also, the framework is not presumed to be unique. Other behavioral theories, such as social cognitive theory, could be extended to include community social concepts, such as social capital.

In addition, despite recent calls from the Institute of Medicine for multilevel interventions (Institute of Medicine, 2000), relatively few interventions thus far have targeted social and contextual environmental factors at city, neighborhood, or group levels (Golden & Earp, 2012). Such interventions may target modification of the social variable (e.g., see the Enhancing Recovery in Coronary Heart Disease trial; Carney et al., 2004). Although randomized studies are lacking, evidence suggests that social capital and collective efficacy can be increased via community and economic development (Brune & Bossert, 2009; Michael, Farquhar, Wiggins, & Green, 2008) or by improving neighborhoods' aesthetic appeal and other physical characteristics (Cohen, Inagami, & Finch, 2008). In addition, interventions should use social variables as a focal point for tailored interventions (Kreuter & Wray, 2003; Rakowski, 1999). These results add to a growing body of research that can inform theoretically based community behavioral interventions and health promotion programs to affect population health.

In summary, this review found that social capital concepts are associated with both health-promoting and disease-promoting behaviors in community settings. Based on data and theory, we propose a conceptual framework for integrating these concepts into existing behavioral theory. Both these results and the conceptual framework can inform development of socially tailored interventions to improve population health in this evolving area of science.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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References

- Addy CL, Wilson DK, Kirtland KA, Ainsworth BE, Sharpe P, Kimsey D. Associations of perceived social and physical environmental supports with physical activity and walking behavior. *American Journal of Public Health*. 2004; 94:440–443. [PubMed: 14998810]
- Afifi RA, Nakkash RT, Khawaja M. Social capital, women's autonomy and smoking among married women in low-income urban neighborhoods of Beirut, Lebanon. *Women's Health Issues*. 2010; 20:156–167. [PubMed: 20211431]
- Ahern J, Galea S, Hubbard A, Syme SL. Neighborhood smoking norms modify the relation between collective efficacy and smoking behavior. *Drug and Alcohol Dependence*. 2009; 100:138–145. [PubMed: 19010610]
- Ainsworth BE, Wilcox S, Thompson WW, Richter DL, Henderson KA. Personal, social, and physical environmental correlates of physical activity in African-American women in South Carolina. *American Journal of Preventive Medicine*. 2003; 25(3 Suppl. 1):23–29. [PubMed: 14499806]
- Ajzen I. The theory of planned behavior. *Organizational Behavior and Human Decision Processes*. 1991; 50:179–211.
- Ball K, Cleland VJ, Timperio AF, Salmon J, Giles-Corti B, Crawford DA. Love thy neighbour? Associations of social capital and crime with physical activity amongst women. *Social Science & Medicine*. 2010; 71:807–814. [PubMed: 20561727]
- Ball K, Jeffery RW, Abbott G, McNaughton SA, Crawford D. Is healthy behavior contagious? Associations of social norms with physical activity and healthy eating. *International Journal of Behavioral Nutrition and Physical Activity*. 2010; 7:86. [PubMed: 21138550]
- Bandura, A. *Social learning theory*. Englewood Cliffs, NJ: Prentice Hall; 1977.
- Bandura A. Human agency in social cognitive theory. *American Psychology*. 1989; 44:1175–1184.
- Bandura A. Exercise of human agency through collective efficacy. *Current Directions in Psychological Science*. 2000; 9(3):75–78.
- Berkman, LF.; Glass, T. Social integration, social networks, social support and health. In: Berkman, LF.; Kawachi, I., editors. *Social epidemiology*. Oxford, England: Oxford University Press; 2000. p. 137-173.
- Bourdieu, P. The forms of capital. In: Richardson, JG., editor. *The handbook of theory: Research for the sociology of education*. New York, NY: Greenwood Press; 1986. p. 241-258.
- Brune NE, Bossert T. Building social capital in post-conflict communities: Evidence from Nicaragua. *Social Science & Medicine*. 2009; 68:885–893. [PubMed: 19155112]
- Brunie A. Meaningful distinctions within a concept: Relational, collective, and generalized social capital. *Social Science Research*. 2009; 38:251–265. [PubMed: 19827175]
- Burke NJ, Joseph G, Pasick RJ, Barker JC. Theorizing social context: Rethinking behavioral theory. *Health Education & Behavior*. 2009; 36(5 Suppl.):55S–70S. [PubMed: 19805791]
- Carney RM, Blumenthal JA, Freedland KE, Youngblood M, Veith RC, Burg MM, Jaffe AS. Depression and late mortality after myocardial infarction in the Enhancing Recovery in Coronary Heart Disease (ENRICH) study. *Psychosomatic Medicine*. 2004; 66:466–474. [PubMed: 15272090]
- Carpiano RM. Toward a neighborhood resource-based theory of social capital for health: Can Bourdieu and sociology help? *Social Science & Medicine*. 2006; 62:165–175. [PubMed: 15992978]
- Carpiano RM. Neighborhood social capital and adult health: An empirical test of a Bourdieu-based model. *Health Place*. 2007; 13:639–655. [PubMed: 17084655]
- Carpiano RM. Actual or potential neighborhood resources and access to them: Testing hypotheses of social capital for the health of female caregivers. *Social Science & Medicine*. 2008; 67:568–582. [PubMed: 18547699]
- Chaix B. Geographic life environments and coronary heart disease: A literature review, theoretical contributions, methodological updates, and a research agenda. *Annual Review of Public Health*. 2009; 30:81–105.

- Chen YH, Chen PL, Huang WG, Chiou HY, Hsu CY, Chao KY. Association between social climate for smoking and youth smoking behaviors in Taiwan: An ecological study. *International Journal of Nursing Studies*. 2010; 47:1253–1261. [PubMed: 20233616]
- Christakis NA, Fowler JH. The spread of obesity in a large social network over 32 years. *New England Journal of Medicine*. 2007; 357:370–379. [PubMed: 17652652]
- Christakis NA, Fowler JH. The collective dynamics of smoking in a large social network. *New England Journal of Medicine*. 2008; 358:2249–2258. [PubMed: 18499567]
- Chuang YC, Chuang KY. Gender differences in relationships between social capital and individual smoking and drinking behavior in Taiwan. *Social Science & Medicine*. 2008; 67:1321–1330. [PubMed: 18667260]
- Cleland V, Ball K, Hume C, Timperio A, King AC, Crawford D. Individual, social and environmental correlates of physical activity among women living in socioeconomically disadvantaged neighbourhoods. *Social Science & Medicine*. 2010; 70:2011–2018. [PubMed: 20362380]
- Cleland VJ, Timperio A, Crawford D. Are perceptions of the physical and social environment associated with mothers' walking for leisure and for transport? A longitudinal study. *Preventive Medicine*. 2008; 47:188–193. [PubMed: 18584859]
- Cohen DA, Inagami S, Finch B. The built environment and collective efficacy. *Health Place*. 2008; 14:198–208. [PubMed: 17644395]
- Coleman JS. Social capital in the creation of human capital. *American Journal of Sociology*. 1988; 94(Suppl):S95–S120.
- Cradock AL, Kawachi I, Colditz GA, Gortmaker SL, Buka SL. Neighborhood social cohesion and youth participation in physical activity in Chicago. *Social Science & Medicine*. 2009; 68:427–435. [PubMed: 19036490]
- Deforche B, Van Dyck D, Verloigne M, De Bourdeaudhuij I. Perceived social and physical environmental correlates of physical activity in older adolescents and the moderating effect of self-efficacy. *Preventive Medicine*. 2010; 50(Suppl. 1):S24–S29. [PubMed: 19818363]
- Deshpande AD, Baker EA, Lovegreen SL, Brownson RC. Environmental correlates of physical activity among individuals with diabetes in the rural Midwest. *Diabetes Care*. 2005; 28:1012–1018. [PubMed: 15855559]
- Diez Roux AV. The study of group-level factors in epidemiology: Rethinking variables, study designs, and analytical approaches. *Epidemiology Review*. 2004; 26:104–111.
- Duke NN, Borowsky IW, Pettingell SL. Parent perceptions of neighborhood: Relationships with US youth physical activity and weight status. *Maternal and Child Health Journal*. 2010; 16:149–157. [PubMed: 21153758]
- du Toit L, Cerin E, Leslie E, Owen N. Does walking in the neighbourhood enhance local sociability? *Urban Studies*. 2007; 44:1677–1695.
- Echeverria S, Diez-Roux AV, Shea S, Borrell LN, Jackson S. Associations of neighborhood problems and neighborhood social cohesion with mental health and health behaviors: The Multi-Ethnic Study of Atherosclerosis. *Health & Place*. 2008; 14:853–865. [PubMed: 18328772]
- Ennett ST, Foshee VA, Bauman KE, Hussong A, Faris R, Hipp JR, Cai L. A social contextual analysis of youth cigarette smoking development. *Nicotine & Tobacco Research*. 2010; 12:950–962. [PubMed: 20688870]
- Etzioni A. Social norms: Internalization, persuasion, and history. *Law & Society Review*. 2000; 34:157–178.
- Evenson KR, Sarmiento OL, Tawney KW, Macon ML, Ammerman AS. Personal, social, and environmental correlates of physical activity in North Carolina Latina immigrants. *American Journal of Preventive Medicine*. 2003; 25(3 Suppl. 1):77–85. [PubMed: 14499813]
- Fisher KJ, Li F, Michael Y, Cleveland M. Neighborhood-level influences on physical activity among older adults: A multilevel analysis. *Journal of Aging and Physical Activity*. 2004; 12:45–63. Retrieved from <http://www.ncbi.nlm.nih.gov/pubmed/15211020?dopt=Citation>. [PubMed: 15211020]
- Frohlich KL, Potvin L, Gauvin L, Chabot P. Youth smoking initiation: Disentangling context from composition. *Health & Place*. 2002; 8:155–166. [PubMed: 12135639]

- Giordano GN, Lindstrom M. The impact of social capital on changes in smoking behaviour: A longitudinal cohort study. *European Journal of Public Health*. 2011; 21:347–354. [PubMed: 20570962]
- Glass TA, McAtee MJ. Behavioral science at the crossroads in public health: Extending horizons, envisioning the future. *Social Science & Medicine*. 2006; 62:1650–1671. [PubMed: 16198467]
- Golden SD, Earp JA. Social ecological approaches to individuals and their contexts: Twenty years of *Health Education & Behavior* health promotion interventions. *Health Education & Behavior*. 2012; 39:364–372. [PubMed: 22267868]
- Greiner KA, Li C, Kawachi I, Hunt DC, Ahluwalia JS. The relationships of social participation and community ratings to health and health behaviors in areas with high and low population density. *Social Science & Medicine*. 2004; 59:2303–2312. [PubMed: 15450705]
- Harpham T, Grant E, Thomas E. Measuring social capital within health surveys: Key issues. *Health Policy Planning*. 2002; 17:106–111. [PubMed: 11861592]
- Hawe P, Shiell A. Social capital and health promotion: A review. *Social Science & Medicine*. 2000; 51:871–885. [PubMed: 10972431]
- Heaney, CA.; Isreal, BA. Social networks and social support. In: Glanz, K.; Rimer, BK.; Viswanath, K., editors. *Health behavior and health education: Theory, research and practice*. 4th ed.. San Francisco, CA: Jossey-Bass; 2008. p. 189-210.
- Hoehner CM, Brennan Ramirez LK, Elliott MB, Handy SL, Brownson RC. Perceived and objective environmental measures and physical activity among urban adults. *American Journal of Preventive Medicine*. 2005; 28(2 Suppl. 2):105–116. [PubMed: 15694518]
- Hooker SP, Wilson DK, Griffin SF, Ainsworth BE. Perceptions of environmental supports for physical activity in African American and White adults in a rural county in South Carolina. *Preventing Chronic Disease*. 2005; 2(4) Retrieved from http://www.cdc.gov/pcd/issues/2005/oct/05_0048.htm.
- House JS, Umberson D, Landis KR. Structures and Processes of Social Support. *Annual Review of Sociology*. 1988; 14:293–318.
- Hume C, Jorna M, Arundell L, Saunders J, Crawford D, Salmon J. Are children's perceptions of neighbourhood social environments associated with their walking and physical activity? *Journal of Science and Medicine in Sport*. 2009; 12:637–641. [PubMed: 18835744]
- Hume C, Timperio A, Salmon J, Carver A, Giles-Corti B, Crawford D. Walking and cycling to school: Predictors of increases among children and adolescents. *American Journal of Preventive Medicine*. 2009; 36:195–200. [PubMed: 19162431]
- Institute of Medicine. *Promoting health: Intervention strategies from social and behavioral research*. Washington, DC: National Academies Press; 2000.
- Kamphuis CB, Van Lenthe FJ, Giskes K, Huisman M, Brug J, Mackenbach JP. Socioeconomic status, environmental and individual factors, and sports participation. *Medicine & Science in Sports – Exercise*. 2008; 40:71–81.
- Kamphuis CB, Van Lenthe FJ, Giskes K, Huisman M, Brug J, Mackenbach JP. Socioeconomic differences in lack of recreational walking among older adults: The role of neighbourhood and individual factors. *International Journal of Behavioral Nutrition and Physical Activity*. 2009; 6
- Kandula NR, Wen M, Jacobs EA, Lauderdale DS. Association between neighborhood context and smoking prevalence among Asian Americans. *American Journal of Public Health*. 2009; 99:885–892. [PubMed: 19299683]
- Kawachi, I.; Berkman, LF. Social cohesion, social capital, and health. In: Berkman, LF.; Kawachi, I., editors. *Social epidemiology*. Oxford, England: Oxford University Press; 2000. p. 174-190.
- Kim J, Liu J, Colabianchi N, Pate RR. The effect of perceived and structural neighborhood conditions on adolescents' physical activity and sedentary behaviors. *Archives of Pediatrics & Adolescent Medicine*. 2010; 164:935–942. [PubMed: 20921351]
- Kreuter MW, Wray RJ. Tailored and targeted health communication: Strategies for enhancing information relevance. *American Journal of Health Behavior*. 2003; 27(Suppl. 3):S227–S232. [PubMed: 14672383]
- Lee C. Environment and active living: the roles of health risk and economic factors. *American Journal of Health Promotion*. 2007; 21(4 Suppl):293–304. [PubMed: 17465174]

- Li F, Fisher KJ, Brownson RC. A multilevel analysis of change in neighborhood walking activity in older adults. *Journal of Aging and Physical Activity*. 2005; 13:145–159. [PubMed: 15995261]
- Li YJ, Pickles A, Savage M. Social capital and social trust in Britain. *European Sociological Review*. 2005; 21:109–123.
- Lindstrom M. Social capital and the miniaturization of community among daily and intermittent smokers: A populationbased study. *Preventive Medicine*. 2003; 36:177–184. [PubMed: 12590993]
- Lindstrom M. Social capital, political trust and daily smoking and smoking cessation: A population-based study in southern Sweden. *Public Health*. 2009; 123:496–501. [PubMed: 19616270]
- Lochner K, Kawachi I, Kennedy BP. Social capital: A guide to its measurement. *Health & Place*. 1999; 5:259–270. [PubMed: 10984580]
- Loucaides CA. School location and gender differences in personal, social, and environmental correlates of physical activity in Cypriot middle school children. *Journal of Physical Activity & Health*. 2009; 6:722–730. [PubMed: 20101915]
- Lundborg P. Social capital and substance use among Swedish adolescents: An explorative study. *Social Science & Medicine*. 2005; 61:1151–1158. [PubMed: 15970227]
- Macinko J, Starfield B. The utility of social capital in research on health determinants. *Milbank Quarterly*. 2001; 79:387–427. [PubMed: 11565162]
- McAlister, AL.; Perry, CL.; Parcel, GS. How individuals, environments, and health behaviors interact: Social cognitive theory. In: Glanz, K.; Rimer, BK.; Viswanath, K., editors. *Health behavior and health education: Theory, research, and practice*. 4th ed.. San Francisco, CA: Jossey-Bass; 2008. p. 169-188.
- McDonald NC. Travel and the social environment: Evidence from Alameda County, California. *Transportation Research Part D-Transport and Environment*. 2007; 12:53–63.
- McDonald NC, Deakin E, Aalborg AE. Influence of the social environment on children's school travel. *Preventive Medicine*. 2010; 50(Suppl. 1):S65–S68. [PubMed: 19796654]
- McMillan DW, Chavis DM. Sense of community: A definition and theory. *Journal of Community Psychology*. 1986; 14:6–23.
- McNeill LH, Kreuter MW, Subramanian SV. Social environment and physical activity: A review of concepts and evidence. *Social Science & Medicine*. 2006; 63:1011–1022. [PubMed: 16650513]
- Mendes de Leon CF, Cagney KA, Bienias JL, Barnes LL, Skarupski KA, Scherr PA, Evans DA. Neighborhood social cohesion and disorder in relation to walking in community-dwelling older adults: A multilevel analysis. *Journal of Aging and Health*. 2009; 21:155–171. [PubMed: 19144973]
- Michael YL, Farquhar SA, Wiggins N, Green MK. Findings from a community-based participatory prevention research intervention designed to increase social capital in Latino and African American communities. *Journal of Immigrant & Minority Health*. 2008; 10:281–289. [PubMed: 17665307]
- Montaño, DE.; Kasprzyk, D. Theory of reasoned action, theory of planned behavior, and the integrated behavioral model. In: Glanz, K.; Rimer, BK.; Viswanath, K., editors. *Health behavior and health education: Theory, research, and practice*. 4th ed.. San Francisco, CA: Jossey-Bass; 2008. p. 67-96.
- Moore S, Daniel M, Gauvin L, Dube L. Not all social capital is good capital. *Health & Place*. 2009; 15:1071–1077. [PubMed: 19482506]
- Morgan A, Haglund BJ. Social capital does matter for adolescent health: Evidence from the English HBSC study. *Health Promotion International*. 2009; 24:363–372. [PubMed: 19717401]
- Mota J, Almeida M, Santos P, Ribeiro JC. Perceived neighborhood environments and physical activity in adolescents. *Preventive Medicine*. 2005; 41:834–836. [PubMed: 16137754]
- Musick K, Seltzer JA, Schwartz CR. Neighborhood norms and substance use among teens. *Social Science Research*. 2008; 37:138–155. [PubMed: 18496598]
- Pabayo R, Belsky J, Gauvin L, Curtis S. Do area characteristics predict change in moderate-to-vigorous physical activity from ages 11 to 15 years? *Social Science & Medicine*. 2010; 72:430–438. [PubMed: 21093137]

- Patterson JM, Eberly LE, Ding Y, Hargreaves M. Associations of smoking prevalence with individual and area level social cohesion. *Journal of Epidemiology & Community Health*. 2004; 58:692–697. [PubMed: 15252073]
- Poortinga W. Do health behaviors mediate the association between social capital and health? *Preventive Medicine*. 2006a; 43:488–493. [PubMed: 16860857]
- Poortinga W. Perceptions of the environment, physical activity, and obesity. *Social Science & Medicine*. 2006b; 63:2835–2846. [PubMed: 16952415]
- Portes A. Social capital: Its origins and applications in modern sociology. *Annual Review of Sociology*. 1998; 24:1–24.
- Rakowski W. The potential variances of tailoring in health behavior interventions. *Annals of Behavioral Medicine*. 1999; 21:284–289. [PubMed: 10721434]
- Raudenbush SW, Sampson RJ. “Ecometrics”: Toward a science of assessing ecological settings, with application to the systematic social observation of neighborhoods. *Sociological Methodology*. 1999; 29:1–41.
- Rohm YD, Voorhees CC. Personal, social, and environmental correlates of physical activity in urban African-American women. *American Journal of Preventive Medicine*. 2003; 25(3 Suppl. 1):38–44.
- Ryder NB. The cohort as a concept in the study of social change. *American Sociological Review*. 1965; 30:843–861. [PubMed: 5846306]
- Salmon J, Salmon L, Crawford DA, Hume C, Timperio A. Associations among individual, social, and environmental barriers and children’s walking or cycling to school. *American Journal of Health Promotion*. 2007; 22:107–113. [PubMed: 18019887]
- Sampson RJ, Raudenbush SW, Earls F. Neighborhoods and violent crime: A multilevel study of collective efficacy. *Science*. 1997; 277:918–924. [PubMed: 9252316]
- Sanderson BK, Foushee HR, Bittner V, Cornell CE, Stalker V, Shelton S, Pulley L. Personal, social, and physical environmental correlates of physical activity in rural African-American women in Alabama. *American Journal of Preventive Medicine*. 2003; 25(3 Suppl. 1):30–37. [PubMed: 14499807]
- Sapag JC, Poblete FC, Eicher C, Aracena M, Caneo C, Vera G, Bradford E. Tobacco smoking in urban neighborhoods: Exploring social capital as a protective factor in Santiago, Chile. *Nicotine & Tobacco Research*. 2010; 12:927–936. [PubMed: 20693233]
- Siahpush M, Borland R, Taylor J, Singh GK, Ansari Z, Serraglio A. The association of smoking with perception of income inequality, relative material well-being, and social capital. *Social Science & Medicine*. 2006; 63:2801–2812. [PubMed: 16971030]
- Singh-Manoux A, Marmot M. Role of socialization in explaining social inequalities in health. *Social Science & Medicine*. 2005; 60:2129–2133. [PubMed: 15743660]
- Sunstein CR. Social norms and social roles. *Columbia Law Review*. 1996; 96:903–968.
- Szreter S, Woolcock M. Health by association? Social capital, social theory, and the political economy of public health. *International Journal of Epidemiology*. 2004; 33:650–667. [PubMed: 15282219]
- Thompson JL, Wolfe VK, Wilson N, Pardilla MN, Perez G. Personal, social, and environmental correlates of physical activity in Native American women. *American Journal of Preventive Medicine*. 2003; 25(3 Suppl. 1):53–60. [PubMed: 14499810]
- Uchino, BN. *Social support and physical health: Understanding the health consequences of relationships*. New Haven, CT: Yale University Press; 2004.
- Ueshima K, Fujiwara T, Takao S, Suzuki E, Iwase T, Doi H, Kawachi I. Does social capital promote physical activity? A population-based study in Japan. *PLoS One*. 2010; 5(8):e12135. [PubMed: 20808822]
- Voorhees CC, Rohm YD. Personal, social, and physical environmental correlates of physical activity levels in urban Latinas. *American Journal of Preventive Medicine*. 2003; 25(3. Suppl. 1):61–68. [PubMed: 14499811]
- Wen M, Browning CR, Cagney KA. Neighbourhood deprivation, social capital and regular exercise during adulthood: A multilevel study in Chicago. *Urban Studies*. 2007; 44:2651–2671.

- Wen M, Kandula NR, Lauderdale DS. Walking for transportation or leisure: What difference does the neighborhood make? *Journal of General Internal Medicine*. 2007; 22:1674–1680. [PubMed: 17932724]
- Wendel-Vos W, Droomers M, Kremers S, Brug J, van Lenthe F. Potential environmental determinants of physical activity in adults: A systematic review. *Obesity Review*. 2007; 8:425–440.
- Wilbur J, Chandler PJ, Dancy B, Lee H. Correlates of physical activity in urban Midwestern African-American women. *American Journal of Preventive Medicine*. 2003a; 25(3 Suppl. 1):45–52. [PubMed: 14499809]
- Wilbur J, Chandler PJ, Dancy B, Lee H. Correlates of physical activity in urban Midwestern Latinas. *American Journal of Preventive Medicine*. 2003b; 25(3 Suppl. 1):69–76. [PubMed: 14499812]
- Wilkinson D. The multidimensional nature of social cohesion: Psychological sense of community, attraction, and neighboring. *American Journal of Community Psychology*. 2007; 40:214–229. [PubMed: 17909963]
- Wilson DK, Ainsworth BE, Bowles H. Body mass index and environmental supports for physical activity among active and inactive residents of a U.S. southeastern county. *Health Psychology*. 2007; 26:710–717. [PubMed: 18020843]
- Wood L, Frank LD, Giles-Corti B. Sense of community and its relationship with walking and neighborhood design. *Social Science & Medicine*. 2010; 70:1381–1390. [PubMed: 20189699]

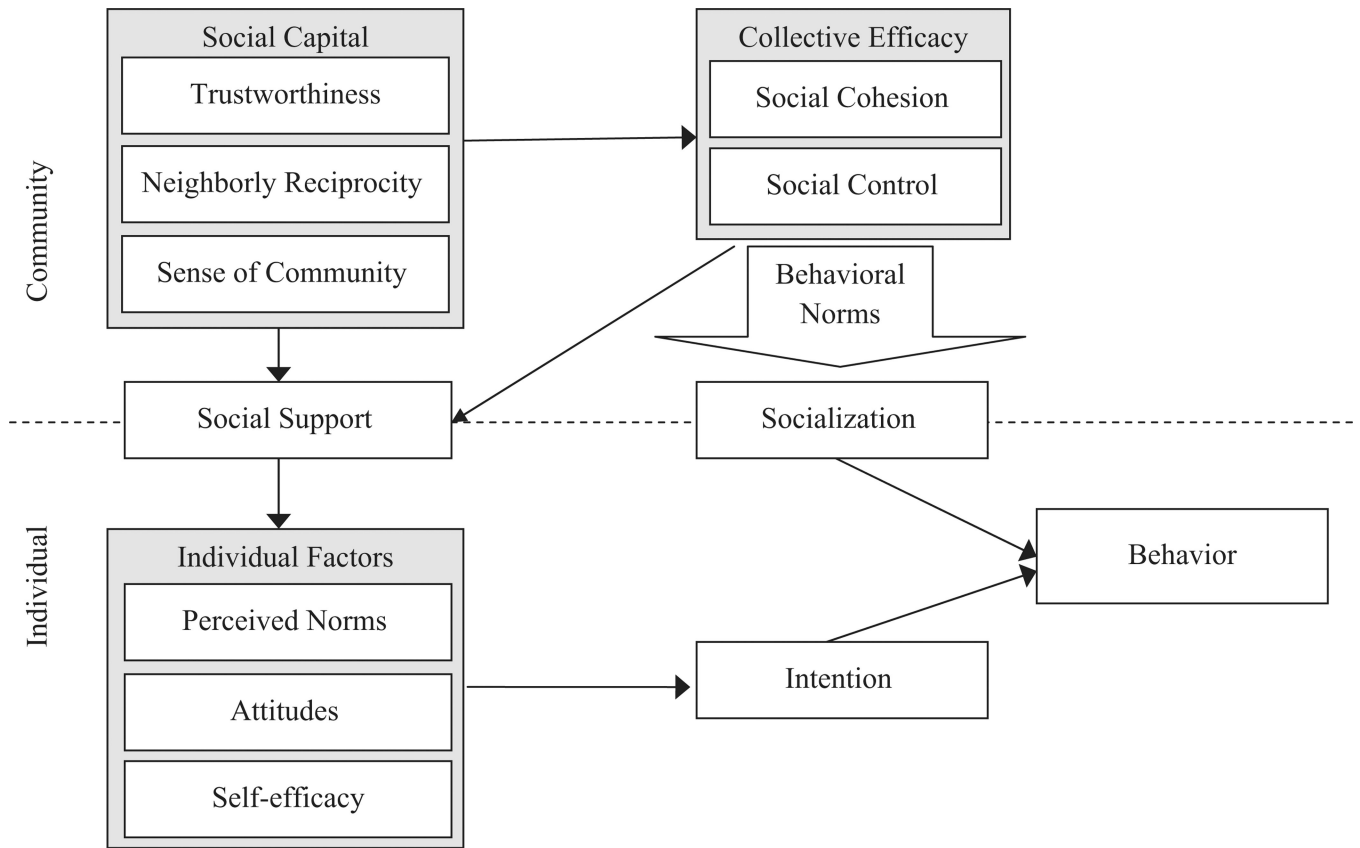


Figure 1. Conceptual framework integrating community social capital, community collective efficacy, and behavioral norms into behavioral theory.

Note. Adapted from the theory of planned behavior, taken from Montaño and Kasprzyk (2008).

Table 1 Summary of Association Between Community Social Capital Concepts and Community Collective Efficacy Concepts With Health-Promoting Behaviors.

| Article | Sample | Multilevel | Trustworthiness | Neighborhood Reciprocity | Sense of Community | Collective Efficacy | Social Control | Social Cohesion |
|--|---|------------|-----------------|--------------------------|--------------------|---------------------|----------------|-----------------|
| Physical activity | | | | | | | | |
| Total physical activity | | | | | | | | |
| Addy et al. (2004), Wilson, Ainsworth, and Bowles (2007) | 1,270 U.S. adults 18 years | N | + | | | | | |
| Ainsworth, Wilcox, Thompson, Richter, and Henderson (2003) | 917 U.S. Black women 20–50 years | N | | | 0 | | | |
| Cradock et al. (2009) | 680 U.S. adolescents 11–15 years | Y | | | | | | + |
| Deshpande, Baker, Lovegreen, and Brownson (2005) | 274 U.S. diabetic adults | N | 0 | 0 | 0 | | | 0 |
| Duke, Borowsky, and Pettingell (2010) | Representative 64,076 U.S. children 6–17 years | N | + | + | | | | |
| Evenson, Sarmiento, Tawney, Macon, and Ammerman (2003) | 671 U.S. Hispanic female immigrants 20–50 years | N | | | 0 | | | |
| Greiner, Li, Kawachi, Hunt, and Ahluwalia (2004) | 4,601 U.S. adults | Y | | | + | | | |
| Hooker, Wilson, Griffin, and Ainsworth (2005) | 1,165 U.S. adults 18 years | N | B:0 W:0 | | | | | |
| Hume, Jorna, et al. (2009) | 764 Australian adolescents 9–12 years | N | | | | | | + |
| Kim, Liu, Colabianchi, and Pate (2010) | Representative 13,668 U.S. adolescents, Grades 7–12 | Y | | | | | +/– <i>a</i> | |
| Morgan and Haglund (2009) | Representative 6,425 U.K. adolescents 11–15 years | N | 0 | | | 0 | | |
| Pabayo, Belsky, Gauvin, and Curtis (2010) | 889 U.S. adolescents 10–15 years | N | | | | | | + |
| Pooritinga, (2006b) | Representative 14,836 English adults 16 years | Y | 0 | 0 | 0 | | | |
| Rohm and Voorhees (2003) | 234 U.S. Black women 20–50 years | N | | | 0 | | | |
| Sanderson et al. (2003) | 567 U.S. women 20–50 years | N | | | 0 | | | |
| Thompson, Wolfe, Wilson, Pardilla, and Perez (2003) | 350 Native American women 20–50 years | N | | | 0 | | | |
| Ueshima et al. (2010) | 2260 Japanese adults 20–80 years | N | + | | | | | |
| Voorhees and Rohm (2003) | 285 U.S. Hispanic females 20–50 years | N | | | 0 | | | |
| Wen, Browning, and Cagney (2007) | 907 U.S. adults 18 years | Y | 0 | 0 | | | | |

| Article | Sample | Multilevel | Trustworthiness | Neighborhood Reciprocity | Sense of Community | Collective Efficacy | Social Control | Social Cohesion |
|--|---|------------|--------------------|--------------------------|--------------------|---------------------|----------------|---------------------|
| Wilbur, Chandler, Dancy, and Lee (2003a) | 399 U.S. Black women 20–50 years | N | | | 0 | | | |
| Wilbur, Chandler, Dancy, and Lee (2003b) | 300 U.S. Hispanic females 20–50 years | N | | | 0 | | | |
| Leisure physical activity | | | | | | | | 0 |
| Ball, Cleland, et al. (2010) | 1,405 Australian women 18–65 years | Y | + | 0 | | | | |
| Cleland et al. (2010) | 4,108 Australian low-income women 18–45 years | Y | | | | | | + |
| Transport physical activity | | | | | | | | |
| Cleland et al. (2010) | 4,108 Australian low-income women 18–45 years | Y | | | | | | 0 |
| Hume, Timperio, et al. (2009) | 309 Australian 8–9 years and 13–15 years | N | | | | | | 0 |
| Salmon, Salmon, Crawford, Hume, and Timperio (2007) | 720 Australian children 4–13 years | N | 0 | | | | | |
| Walking | | | | | | | | |
| Addy et al. (2004), Wilson et al. (2007) | 1,270 U.S. adults 18 years | N | 0 | | | | | |
| Ball, Cleland, et al. (2010) | 1,405 Australian women 18–65 years | Y | 0 | 0 | | | | 0 |
| Echeverria, Diez-Roux, Shea, Borrell, and Jackson (2008) | 5,943 U.S. multiethnic adults 45–85 years | Y | | | | | | + / 0 ^b |
| Fisher, Li, Michael, and Cleveland (2004) | 582 U.S. adults 65 years | Y | | | | | | + |
| Hooker et al. (2005) | 1,165 U.S. adults 18 years | N | B:0 W:0 | | | | | |
| Hume, Jorna, et al. (2009) | 764 Australian adolescents 9–12 years | N | | | | | | + |
| Kamphuis et al. (2009) | 1,994 Dutch adults 55–75 years | Y | | | | | 0 | – |
| F. Li, Fisher, and Brownson (2005) | 303 U.S. adults 65 years | Y | | | | | | 0 |
| Mendes de Leon et al. (2009) | 4,317 U.S. adults 65 years | Y | | | | | | 0 / + ^a |
| Pooritinga (2006b) | Representative 14,836 English adults 16 years | Y | + | 0 | 0 | | | |
| Wen, Kandula, and Lauderdale (2007) | 41,545 U.S. adults 18 years | Y | | | | | | + W:++ H:++ B:0 A:0 |
| Leisure walking | | | | | | | | |
| Cleland, Timperio, and Crawford (2008) | 357 Australian mothers | N | + / + ^c | + / 0 ^c | | | | + / + ^c |
| du Toit, Cerin, Leslie, and Owen (2007) ^d | 2,194 Australian adults | Y | | | + | | | |
| Wood, Frank, and Giles-Corti (2010) ^d | 609 U.S. adults 20–70 years | N | | | + | | | |

| Article | Sample | Multilevel | Trustworthiness | Neighborhood Reciprocity | Sense of Community | Collective Efficacy | Social Control | Social Cohesion |
|--|--|------------|------------------------|--------------------------|--------------------|---------------------|--------------------|--------------------|
| Transport walking | | | | | | | | |
| Cleland et al. (2008) | 357 Australian mothers | N | 0 / 0 ^c | 0 / 0 ^c | | | | + / 0 ^c |
| Hume, Timperio, et al. (2009) | 309 Australian 8–9 years and 13–15 years | N | | 0 | | | | |
| Deforche, Van Dyck, Verloigne, and De Bourdeaudhuij (2010) | 1,445 Belgian adolescents | Y | | + | | | | |
| du Toit et al. (2007) ^d | 2,194 Australian adults | Y | | + | | | | |
| McDonald (2007) | 614 U.S. youth 5–18 years | Y | | | | + / 0 ^e | | |
| McDonald, Deakin, and Aalborg (2010) | 357 U.S. adolescents 10–14 years | N | | | | | + | |
| Sports participation | | | | | | | | |
| Deforche et al. (2010) | 1,445 Belgian adolescents | Y | | | 0 | | | |
| Kamphuis et al. (2008) | 3,839 Dutch adults, 25–75 years | Y | | | + | | | + |
| Poortinga (2006b) | Representative 14,836 English adults 16 years | Y | | 0 | 0 | | | |
| Smoking cessation | | | | | | | | |
| Giordano and Lindstrom (2011) | Representative 10,512 U.K. adults | N | + / 0 / 0 ^f | | | | | |
| Lindstrom (2009) | 27,757 Swedish adults | N | M++F++ | | | | | |
| Fruit and vegetable intake | | | | | | | | |
| Morgan and Haglund (2009) | Representative 6425 U.K. adolescents 11–15 years | N | Fruit: 0 Vegetable: 0 | | | | Fruit: + Veg: 0 | |
| Poortinga (2006a) | Representative 7,394 English adults 16 years | Y | | + | | | | |

Note. Fully adjusted models were chosen when possible, but interaction terms were avoided to allow comparison. Also, in studies that presented more than one way to characterize the outcome, the study is described here as having significant findings if any of the results were significant. Multilevel refers to any use of statistical analyses that accounts for community clustering of responses. + = positive association; – = negative association; 0 = null association. For stratified results, M = male, F = female, B = Black, W = White, H = Hispanic, A = Asian.

^aThese results represent the social variable measured at the individual and neighborhood levels, respectively, in the same model.

^bThese results represent the social variable measured at the individual and neighborhood levels, respectively, in separate models.

^cResults are for baseline and 2-year change in behavior, respectively.

^dWalking is the independent variable in this study.

^eResults are for short-distance commutes and long-distance commutes, respectively.

^fResults correspond to increased trust, stable, and decreased trust, respectively.

Table 2

Summary of Association Between Community Social Capital Concepts and Community Collective Efficacy Concepts With Disease-Promoting Behaviors.

| Article | Sample | Multilevel | Trustworthiness | Neighborhood Reciprocity | Sense of Community | Collective Efficacy | Social Control | Social Cohesion |
|--|---|------------|----------------------------|--------------------------|--------------------|---------------------|----------------|----------------------------|
| Smoking | | | | | | | | |
| Current smoking | | | | | | | | |
| Affifi, Nakkash, and Khawaja (2010) | 1,716 Lebanese low-income married women 15–59 years | N | – | | | | | |
| Ahem, Galea, Hubbard, and Syme (2009) | 4,000 U.S. adults 18 years | Y | | | | 0 / 0 ^a | | |
| Carpiano (2007) | 2,076 U.S. adults | Y | | + | | | | – |
| Carpiano (2008) | 730 U.S. female caregivers | Y | | + | | | 0 | 0 |
| Chuang and Chuang (2008) | 3,713 Taiwanese adults 20 years | Y | – / –a; – / 0 ^b | | | | | 0 / +a; 0 / 0 ^b |
| Echeverria, Diez-Roux, Shea, Borrell, and Jackson (2008) | 5,943 U.S. multiethnic adults 45–85 years | Y | | | | | | 0 |
| Greiner, Li, Kawachi, Hunt, and Ahluwalia (2004) | 4,601 U.S. adults | Y | | | | | | |
| Kandula, Wen, Jacobs, and Lauderdale (2009) | 4,407 Asian American adults 18 years | Y | | | | | | M:– F:0 |
| Lindstrom (2003) | 12,426 Swedish adults | N | | | | | | |
| Lindstrom (2009) | 27,757 Swedish adults | N | | | | | | M:– F:– |
| Lundborg (2005) | 1,330 Swedish adolescents 12–18 years | Y | – | | | | | |
| Morgan and Haglund (2009) | Representative 6,425 U.K. adolescents 11–15 years | N | – | | | | 0 | |
| Musick, Seltzer, and Schwartz (2008) | 890 U.S. adolescents 12–17 years | Y | | | | | + ^c | |
| Patterson, Eberly, Ding, and Hargreaves (2004) | 10,062 U.S. adults | Y | | | | | | – / – ^b |
| Pooritinga (2006b) | Representative 14,836 English adults 16 years | Y | – | | | | | |
| Sapag et al. (2010) | 680 low-income Chilean adults 18 years | N | – | | | | | 0 |
| Siabpush et al. (2006) | 2,762 Australian adults 18 years | Y | 0 / – ^b | | | | | 0 / 0 ^b |
| Smoking initiation Emmett et al. (2010) | 6,544 U.S. adolescents Grades 6–8 | Y | | | | | 0 | 0 |

| Article | Sample | Multilevel | Trustworthiness | Neighborhood Reciprocity | Sense of Community | Collective Efficacy | Social Control | Social Cohesion |
|-------------------------------|-----------------------------------|------------|--------------------|--------------------------|--------------------|---------------------|----------------|-----------------|
| Giordano and Lindstrom (2011) | Representative 10,512 U.K. adults | N | 0/0/0 ^d | | | | | |

Note. Fully adjusted models were chosen when possible, but interaction terms were avoided to allow comparison. Also, in studies that presented more than one way to characterize the outcome, the study is described here as having significant findings if any of the results were significant. Multilevel refers to any use of statistical analyses that accounts for community clustering of responses. + = positive association; - = negative association, 0 = null association. For stratified results, M = male, F = female.

- ^a These results represent the social variable measured at the individual and neighborhood levels, respectively, in separate models.
- ^b These results represent the social variable measured at the individual and neighborhood levels, respectively, in the same model.
- ^c Neighborhoods with high social control and low adult disapproval had increased rates of smoking, whereas neighborhoods with high social control and high adult disapproval had decreased rates of smoking.
- ^d Results correspond to increased trust, stable, and decreased trust, respectively.

Table 3

Summary of Associations Between Community Behavioral Norms and Health-Promoting Behaviors and Disease-Promoting Behaviors.

| Article | Sample | Multilevel | Behavioral Norm Measurement | Results |
|---|--|------------|--|----------------|
| Physical activity | | | | |
| Total physical activity | | | | |
| Addy et al. (2004), Wilson, Ainsworth, and Bowles (2007) | 1,270 U.S. adults 18 years | N | Modeling | 0 |
| Ainsworth, Wilcox, Thompson, Richter, and Henderson (2003) | 917 U.S. Black women 20–50 years | N | Modeling | + |
| Deshpande, Baker, Lovegreen, and Brownson (2005) | 274 U.S. diabetic adults | N | “People in community have the same values” | 0 |
| Evenson et al. (2003) | 671 U.S. Hispanic female immigrants 20–50 years | N | Modeling | + |
| Hooker, Wilson, Griffin, and Ainsworth (2005) | 1,165 U.S. adults 18 years | N | Modeling | B: 0; W: + |
| Loucaides (2009) | 652 Cypriot middle school students | N | Modeling | + |
| Mota, Almeida, Santos, and Ribeiro (2005) | 1,123 Portuguese adolescents Grades 7–12 | N | Modeling | 0 |
| Rohm and Voorhees (2003) | 234 U.S. Black women 20–50 years | N | Modeling | 0 |
| Sanderson et al. (2003) | 567 U.S. women 20–50 years | N | Modeling | + |
| Thompson, Wolfe, Wilson, Pardilla, and Perez (2003) | 350 Native American women 20–50 years | N | Modeling | + |
| Voorhees and Rohm (2003) | 285 U.S. Hispanic females 20–50 years | N | Modeling | – |
| Wilbur, Chandler, Dancy, and Lee (2003b) | 300 U.S. Hispanic females 20–50 years | N | Modeling | + |
| Wilbur, Chandler, Dancy, and Lee (2003a) | 399 U.S. Black women 20–50 years | N | Modeling | 0 |
| Leisure physical activity | | | | |
| Ball, Jeffery, Abbott, McNaughton, and Crawford (2010) | 3,610 Australian low-income women 18–45 years | Y | Modeling | + |
| Hoehner, Brennan Ramirez, Elliott, Handy, and Brownson (2005) | 1,053 U.S. adults 18 years, high- and low-income areas | N | (a) Count of people being active in the neighborhood (b) Modeling | (a) 0 (b) 0 |
| Lee (2007) | 438 U.S. “able-bodied” adults | N | Modeling | + |
| Transport physical activity | | | | |
| Hoehner et al. (2005) | 1,053 U.S. adults 18 years, high- and low-income areas | N | (a) Count of people being active in the neighborhood (b) Modeling | (a) + (b) 0 |
| Lee (2007) | 438 U.S. “able-bodied” adults | N | Modeling | 0 |
| Walking | | | | |
| Addy et al. (2004), Wilson, Ainsworth, and Bowles (2007) | 1,270 U.S. adults 18 years | N | Modeling | + |
| Ball, Jeffery, et al. (2010) | 3,610 Australian low-income women 18–45 years | Y | Modeling | + |

| Article | Sample | Multilevel | Behavioral Norm Measurement | Results |
|---|---------------------------------------|------------------|---|----------|
| Hooker, Wilson, Griffin, and Ainsworth (2005) | 1,165 U.S. adults 18 years | N | Modeling | B: 0 W:+ |
| Smoking | | | | |
| Current smoking | | | | |
| Ahern, Galea, Hubbard, and Syme (2009) | 4,000 U.S. adults 18 years | Y | (a) Perceived neighborhood smoking acceptability | (a) + |
| | | | (b) Neighborhood mean perceived smoking | (b) + |
| | | | (c) Perceived neighborhood smoking prevalence | (c) + |
| | | | (d) Modeling | (d) + |
| Chen et al. (2010) | 22,339 Taiwanese junior high students | N/A ^a | (a) City adult male smoking prevalence (<i>n</i> = 16,688) | (a) 0 |
| | | | (b) City adult female smoking prevalence (<i>n</i> = 16,688) | (b) 0 |
| Musick, Seltzer, and Schwartz (2008) | 890 U.S. adolescents 12–17 years | Y | (a) Neighborhood adult smoking prevalence | (a) 0 |
| | | | (b) Neighborhood mean adult disapproval of adult smoking | (b) 0 |
| Smoking initiation | | | | |
| Ennett et al. (2010) | 6,544 U.S. adolescents Grades 6–8 | Y | Modeling | + |
| Frohlich, Potvin, Gauvin, and Chabot (2002) | 694 Canadian adolescents 11–14 years | Y | (a) Proportion of organizations who inform about antismoking products or the hazards of smoking | (a) 0 |
| | | | (b) Prevalence of smoking bans | (b) 0 |

Note. Fully adjusted models were chosen when possible, but interaction terms were avoided to allow comparison. Also, in studies that presented more than one way to characterize the outcome, the study is described here as having significant findings if any of the results were significant. Multilevel refers to any use of statistical analyses that accounts for community clustering of responses. + = positive association, - = negative association, 0 = null association, and for stratified results, B = Black, W = White.

^aThis study analyzed area-level data for both behavioral norms and behavioral outcomes.