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Article

Social Capital and Walkability as Social Aspects of Sustainability

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Abstract: The concepts of sustainability and sustainable development are frequently described as having three main components, sometimes referred to as the three pillars or the triple bottom line: environmental, economic, and social. Because of an historical focus in the sustainability field on correcting environmental problems, much consideration has been given to environmental issues, especially how they interface with economic ones. Frequently mentioned but rarely examined, the social aspects of sustainability have been considered the weakest and least described pillar. After a brief review of existing concepts and theories, this paper uses a case study approach to examine the third pillar more comprehensively and offers social capital as one measure of social sustainability. Specifically, social capital was used to measure the social-environmental interface of communities. The positive correlation between aspects of the built environment, specifically walkability, and social capital suggests that measuring a social aspect of sustainability may be feasible, especially in the context of community development.

Keywords: walkability; communities; quality of life; sustainability indicators; social capital

1. Introduction

Sustainability is a relevant and popular concept in many fields and is receiving attention in the scientific community. In 2003 the National Research Council presented what it called an emerging research program of sustainability sciences. “Sustainability science focuses on the dynamic interactions between nature and society.” [1] Adams [2], building upon the work of many previous scholars, suggested that sustainability was not simply a combination of economic, environmental and social considerations, but that these three aspects of sustainability depend upon each other in specific ways. The economy is dependent upon society; economy could not survive, and would have no reason to exist, without its context within society. Similarly, society is dependent upon the environment; humans require resources from the environment and rely on the services of functioning ecosystems. Frequently mentioned but rarely examined, the social aspects of sustainability have been considered the weakest and least described pillar. Numerous ways of addressing the social aspect have been suggested, including social capital, which we focus on in this paper. Social capital has been defined as the value of networks and the norms of reciprocity that arise within those networks. After a brief review of existing concepts and theories such as the strengths and weaknesses of social capital, this paper uses a case study approach to examine the third pillar more comprehensively and offers social capital as one measure.

1.1. How have the Social Aspects of Sustainability been Defined?

As the concepts of sustainability and sustainable development and the emerging field of sustainability sciences were becoming established, a large emphasis was placed on understanding the interactions between the natural world and economic systems. The United Nations defines aspects of sustainability with the following environmental indicators: greenhouse gas emissions, ozone layer health, air quality measurements, deforestation rates, desertification rates and measurements of agriculture, biodiversity, toxic chemicals, non-renewable material, hazardous waste, and water use [3]. We consider the following U.N. sustainability indicators social ones: poverty levels, gender equality, nutrition measurements, child mortality, sanitation levels and measures of health, education, housing, crime, population, and employment [4].

Additionally, human well-being is a key aggregating concept that incorporates many of the measures of social sustainability. Terms such as quality of life, standard of living, human development, welfare, life satisfaction, utility, and happiness are some terms used interchangeably with well-being [5]. The Millennium Ecosystems Assessment defined human well-being as including “basic material for a good life, freedom and choice, health, good social relations, and security.” [4] Thus, Colantonio & Dixon [5] break social sustainability into 10 dimensions and policy areas: demographic change (ageing, migration and mobility); education and skills; employment; health and safety; housing and environmental health; identity, sense of place and culture; participation, empowerment and access; social capital; social mixing and cohesion; and well-being, happiness and quality of life. Each of these is measureable and together these could be used to determine the state of social conditions in a community. Some of these measures, including social capital, are considered “emerging trends” and thus their report provides support for further exploration around this topic. Dempsy *et al.* explore the

social aspects of sustainability in an urban setting and suggest that community sustainability and equality of access are key social components [6].

The individual capabilities approach was highlighted by Nobel Prize Economist, Amartya Sen, and it advocates that “policies should not focus on collective outcomes such as the distribution of income, but rather on building individual capabilities, and ensuring that people have the freedom to convert economic wealth into outcomes they desire” [7]. With this freedom it is theorized that people will improve their own social conditions.

Another component of social sustainability is the inclusion and participation of multiple perspectives and individuals, including the public. There is a large volume of literature on public and stakeholder participation in environmental decision-making and this can be extended to sustainability. While a full summary of this literature is not appropriate here, it is important to mention its connection to social sustainability. “Indeed the very soul of [sustainable development] is that it is participatory. It is not something that can be imposed by a small minority of technocrats or policy-makers from above.” [8].

1.2. Social Capital as One Important Measure of Social Sustainability

We focus on social capital as one measure of social aspects of sustainability. The central premise of social capital is that social networks have value. Social capital refers to the collective value of all “social networks” [who people know] and the inclinations that arise from these networks to do things for each other [“norms of reciprocity”] [9]. Social capital has been further defined as the “...features of social organization, such as trust, norms and networks, that can improve the efficiency of society by facilitating coordinated actions.” [10] James Coleman, one of the leading social capital scholars, explains social capital as being defined by its function. Like other forms of capital, social capital can be useful for achieving community goals. In fact, Emery & Flora [11] describe a community capital framework that includes seven different types of capital—natural, cultural, human, social, political, financial, and built. In defining the social capital component of the framework, they describe it as reflecting connections among people and groups or the social adhesive that can influence positive or negative outcomes. It is important to note that social capital is not always a positive concept as groups such as the Mafia and the Klu Klux Klan have been said to have high levels of certain types of social capital [12]. While these are extreme examples, they remind us that increasing social capital, as with many other types of capital, may not always be the desired outcome and decisions to do so should be well informed.

There are a number of methods for measuring social capital and these are evolving as more and more researchers contribute to the field. Instruments from the social science disciplines have been applied to the measurement of social capital, including surveys, interviews, and focus groups. Within these methods both quantitative and qualitative information is elicited. Robert Putnam’s Saguaro Seminar at Harvard University has worked diligently since the publication of *Bowling Alone* in 2000, to articulate ways to measure social capital. As a follow-up to his book, Putman and his researchers administered the Social Capital Benchmark survey, which surveyed approximately 30,000 people, in 40 communities across 29 states in the United States. The extensive phone survey asked individual respondents questions about 11 facets of social capital, which cover trust (social and inter-racial), diversity of friendships, political participation (conventional and protest), civic leadership and

associational involvement, informal socializing, giving and volunteering, faith-based engagement, and equality of civic engagement across the community. In 2006 the Social Capital Community Survey was administered as a follow-up to the 2000 survey by returning to 11 of the original 40 communities and adding 11 different ones. We choose to follow a survey methodology because of the precedent of this work, including its validation of survey questions [13].

Scholarly research has been conducted to show that desired environmental and sustainability outcomes can be linked to social capital [14,15]. Researchers have found social capital to be useful in many situations, such as collective action around environmental issues, to name one example [16]. Additionally, practitioners in the planning and environmental fields are beginning to advocate for using social capital to address environmental challenges. For example, the Climate Leadership Initiative at the University of Oregon has a Social Capital Project and its recent publication suggests utilizing social capital to address communication and behavior related to climate change issues [17]. Several studies have examined the role of social capital in facilitating more resilient communities and organizations [15]. Brondizio *et al.* [18] and Miller & Buys [19] found that social capital played a key role in protecting ecosystems and environmental education engagement strategies, respectively. These efforts suggest that increases in social capital may be able to address many important issues and thus may be a desirable goal/outcome in and of itself.

Connections between social capital and environmental issues and thus sustainable development are understood and valued by several international organizations. The World Bank has done extensive work on developing methods and indices for measuring social capital related to sustainability. Specifically, the Social Capital Thematic Group within the World Bank has two tools for assessing social capital: Social Capital Assessment Tool (SOCAT) and the Social Capital Integrated Questionnaire (SOCAPIQ) [20]. Similarly, the OECD states that, “human and social capital is essential for developing and promoting adequate responses to environmental challenges” [21]. While it has been used by the World Bank for development related measurement and in many sectors of society, social capital has only recently and in a limited manner, been applied to sustainability issues within environmental management [16,22]. Portes and Landolt [23] point out “social capital has a downside in that strong, long standing civic groups may stifle macroeconomic growth by securing a disproportionate share of national resources or inhibiting individual economic advancement by placing heavy personal obligations on members that prevent them from participating in broader social networks” (quoted in Woolcock) [24].

Our methodology benefited from the measures described above as we worked to develop a survey instrument that combined questions from the Social Capital Community Survey and input from communities. The following case study demonstrates how social capital can be included with other measures of sustainability at the community scale.

1.3. Case Study: How can Social Capital Be Used as a Measure of Sustainable Communities?

How we build and move about our communities and neighborhoods is a key component of sustainability. Features of the built environment influence how people navigate their neighborhoods and communities on a daily basis. Land use decisions impact the form of development and a myriad of environmental impacts associated with that development. Transportation decisions alone impact

aspects of environmental sustainability, including air pollution, energy use, and greenhouse gas emissions that contribute to climate change. Being able to walk to various locations instead of driving or taking other mechanized transportation greatly reduces energy use and pollution. Additionally, if individuals are able to walk to locations where one can interact and communicate with other community members, the presence of these “third places” and the act of walking to them may subsequently influence social capital levels [25].

Social capital is usually investigated as an independent variable that is important because of its ability to influence desired outcomes. As mentioned previously, there is an established literature on desirable environmental and sustainability outcomes linked to social capital. We used a slightly different approach in the following case study as we treated social capital as a desired outcome in and of itself and measured it as a dependent variable instead of an independent one.

In order to begin to measure sustainability and look for ways to promote resilience in communities, including social aspects, a community-based approach was employed that drew upon many of the principles of Community Based Participatory Research [26] such as working on community relevant issues and engaging with key stakeholders and citizen throughout the research process. The Cities of Portsmouth and Manchester, New Hampshire in the United States were chosen because of their commitment to sustainability and the existence of a variety of built forms as well as ongoing collaborations with researchers that facilitated interaction. The research process involved interviews and focus groups with key informants, municipal decision makers, and neighborhood leaders that focused on trying to understand how these groups think about and measure sustainability. These discussions were also useful in learning about the two municipalities and their specific neighborhoods. This local knowledge assisted researchers in determining how neighborhoods varied in built form (*i.e.*, urban/mixed use neighborhoods; suburban/less dense neighborhoods) and in socio-demographic characteristics, and subsequently which areas to investigate.

Data from the focus groups and interviews along with extensive literature review helped to determine which questions to include on a door-to-door household survey. The main independent variable of self-perceived walkability was measured by the answers to the survey questions about where individuals can walk to in their neighborhood. One variable demonstrated the number of locations individuals *can* walk to in their community, while the other measured the number of locations survey respondents actually *do* walk to. These locations, influenced by the work of K. Leyden [27], included the following: shopping center, post office, church, school, restaurant, coffee shop/café, library/bookstore, community/rec center, convenience store, home of friend, grocery stores, natural area/open space/park, bar/pub.

Robert Putnam’s social capital short form survey [13] was used as a guide to determine salient questions by which to measure the dependent variable of social capital. Specifically, survey respondents were asked to indicate their levels of **trust** for various groups and individuals. Respondents were also asked about their frequency of participating in the community activities, listed in Figure 1, which were then compiled into a community index. Researchers used principal component analysis to determine the components of both indices.

Figure 1. Community activities used to create community index.

Working on a community project
Volunteering
Donating blood
Attending a public meeting
Attending a political meeting or rally
Attending a club or organizational meeting
Visiting the home of someone of a different neighborhood
Visiting the home of a community leader

Researchers went door to door with surveys to 2,000 homes- 1,000 in Portsmouth and 1,000 in Manchester. The 1,000 households were split into ten neighborhoods of varying built form (as indicated by GIS data and input from focus group participants). From there, one hundred households were randomly selected within each neighborhood. A response rate of approximately 35% yielded nearly 700 returned surveys and provided a rich data set to examine the relationship between walkability and social capital. Survey respondents were asked to indicate which locations they *can* and *do* walk to within their community. These responses were used to create a self-reported walkability score for each respondent and then used to determine if an individual lived within a “more walkable” or a “less walkable” neighborhood. More walkable neighborhoods were defined as having *seven* or more locations for “can” walk or *three or more* locations for “do” walk, based on the respective medians of these questions in the complete data set.

There are many ways to cut the data and Table 1 displays several of those. The first two columns compare the more walkable and less walkable neighborhoods based on the responses to the “can” walk to question. The next two columns compare more and less walkable neighborhoods based on responses to the “do” walk to question. Leyden [27] detailed a similar “can walk to” walkability index, but the “do” walk index along with the division of neighborhoods based on self-perceived walkability rather than researcher designated neighborhood types. We believe this is a unique approach to understanding these relationships.

Table 1. Summary Statistics.

Statistic	More Walkable CAN N = 380	Less Walkable CAN N = 314	More Walkable DO N = 387	Less Walkable DO N = 307
Average number of places “can” or “do” walk to	10	3	6	1
Walking is very convenient in your neighborhood	80%	66%	78%	68%
Walk at least several times per week to get to places in their community	55%	23%	62%	14%

Table 1. Cont.

Statistic	More Walkable CAN N = 380	Less Walkable CAN N = 314	More Walkable DO N = 387	Less Walkable DO N = 307
People can be trusted	41%	27%	41%	26%
Trust people in your neighborhood a lot	52%	41%	47%	47%
Trust police in your community a lot	59%	51%	57%	54%
Worked on a community project in the last year	55%	43%	54%	44%
Attended a public meeting in the last year	50%	44%	50%	45%
Volunteered in the last year	75%	67%	77%	64%
Average community index	4.3/8	3.6/8	4.3/8	3.5/8
Conservative social and political outlook	22%	33%	23%	33%
Liberal social and political outlook	47%	32%	45%	33%
Attend religious services almost every week	24%	27%	21%	30%
Contribute at least \$100 in the past year to charity	75%	67%	71%	71%
% reporting that they have at least very good health	70	61	70	60
Agree that television is my primary form of entertainment	37%	47%	34%	51%
Break down of sex of respondents	M = 37% F = 63%	M = 36% F = 64%	M = 36% F = 64%	M = 36% F = 64%
Average age of respondents	50 years	54 years	50 years	55 years
Average education	Bachelor's	Bachelor's	Bachelor's	Bachelor's
Average income level	\$62,500–\$87,500	\$62,500–\$87,500	\$62,500–\$87,500	\$62,500–\$87,500

Responses to the social capital questions for both types of walkability are similar with a slightly higher response for social capital questions in the neighborhoods with higher “can” walk scores. This difference might be explained by the fact that “can walk” could indicate the presence of so called “third places” or community infrastructure where individuals may be able to interact even if they do not arrive there on foot. Demographic data is also included to add to the explanation for the differences, however, demographics are fairly similar across the groups leading to a stronger correlation between walkability and social capital. The results of students *t*-tests are shown in Table 2. *T*-tests are used to demonstrate that, in both cases of “can” and “do” walk, the more walkable neighborhoods have higher levels of social capital (statistically significant) than the less walkable neighborhoods.

Table 2. Results of means comparisons (*t*-tests) comparing more and less walkable neighborhoods. The median of seven locations was used to divide between walkable and less walkable.

Results of <i>t</i> -tests	Walkable neighborhoods CAN mean (n)	Less Walkable neighborhoods CAN mean (n)	<i>p</i> -value	Walkable neighborhoods DO mean (n)	Less Walkable neighborhoods DO mean (n)	<i>p</i> -value
Trust Index	5.3 (382)	4.8 (311)	0.0001	5.2 (388)	4.8 (305)	0.0013
Community Index	4.3 (380)	3.6 (313)	<0.0001	4.3 (390)	3.5 (307)	<0.0001
Walkability Index	9.9 (379)	2.9 (312)	<0.0001	6.3 (387)	0.8	<0.0001

The data collected in this case study show that respondents perceive the ability to walk to many more locations than they actually do (in more walkable neighborhoods the average can walk response is almost 10 locations and the average do walk response is 6.3). There are many possible personal and infrastructure related reasons for this difference. Factors such as health, time commitments, children, and weather all apparently influence an individual's decision to walk to a location in their neighborhood or community. Survey respondents were directly asked to indicate what might be done in their neighborhood to make them more likely to walk. Sidewalks, safety and lighting were the most frequently mentioned built environment terms that could be improved to encourage more walking. For further information on the data analysis see Rogers *et al.* 2010 [28] or Rogers *et al.* 2012 [29].

2. Conclusions

Overall, this case provides an example of how social capital may be incorporated into measuring and reporting community sustainability efforts. Additionally, it provides evidence of connections between human functioning in society and local neighborhood/community environment. Research suggests that social conditions are a key component of sustainability but are often excluded or glossed over in practice because of their complexity and ambiguity or difficulty in measurement. Social capital, with its established literature and measurement methods, helps provide some clarity. With the many positive benefits of social capital, it can be argued that increasing levels of this dynamic form of capital can help individuals and communities become more sustainable and resilient.

Walkability, measured in this case directly from the perception of survey respondents, was shown to be associated with certain measures of social capital and thus the logical link for developers of new communities as well as those retrofitting older ones would be to focus on creating a more walkable community. This can be achieved through physical infrastructure improvements such as mixed-use development in which housing, business, retail, open space and municipal facilities are all located in an interconnected layout. Coupled with proper sidewalks and safety considerations such as lighting and slower traffic speeds, mixed use development will not only provide a variety of places for individuals to walk to and interact in but also the infrastructure through which to travel on foot. It is hypothesized that at this variety of places, including civic ones, individuals will have the opportunity to interact in ways they wouldn't normally if they resided in area with more segregated land use.

Through these interactions, social ties can be enhanced leading towards greater levels of social capital and the associated positive social outcomes.

While social capital is by no means a panacea for sustainable development issues, it may offer one measurable way for community planners and decision makers to assess the social aspects of sustainability. When considered in tandem with the built environment, specifically walkability, this background and case study also offers actions that can be taken to alter the physical and social infrastructure of a community to make it more conducive to building social capital.

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Conflict of Interest

The authors declare no conflict of interest.

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