

COMBATING OBESITY WITH TREE COOKIES AND MUD PIES: A CASE STUDY OF THE HEALTH IMPACTS OF A COLLABORATIVE DESIGN PROCESS ON THREE NATURAL PLAY SPACES IN NORTHWEST MINNESOTA

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1 ABSTRACT

With rising obesity rates community health is suffering, human connections to nature are dwindling, and social capital is in decline. A growing body of research highlights positive connections between human health and relationships with natural places. Early public parks capitalized on provided benefits to community health and some argue that urban planning and public health policy have since diverged. Given that parks provide opportunities to improve physical, mental, spiritual, social, and environmental health, reevaluation of the relationships between community health and parks should be a revitalized component of community dialog (Maller et al., 2002). Natural play spaces are reemerging as a method for engaging children to improve health through physical activity and provide opportunities for less structured free play with natural materials in outdoor environments. In 2010 public health officials, researchers and concerned citizens set out to design and implement natural play spaces in communities throughout Northwest Minnesota with dual goals of promoting an increased sense of community ownership and promoting healthy, active lifestyles to curb disparate obesity rates. This case study examines the collaborative process between academic, local government, and community stakeholders in the planning, design and implementation of three natural play spaces in rural Northwest Minnesota and evaluates the ability of these types of spaces to foster social capital and provide a setting to improve community health through reconnecting people with nature.

1.1 Keywords

nature play, children, health, engagement

2 INTRODUCTION

Obesity, loss of social capital, and fewer connections to nature are three community health issues faced by many. As entertainment becomes more isolated and electronically based, people are staying indoors more and interacting less within the community. Increased indoor time, especially among children, reduces physical activity and leads to health problems associated with obesity. Isolated entertainment results in less community interaction which then reduces the depth of relationships between community members and thereby weakens community networks. Less time spent outdoors in nature decreases the understanding of and fosters apathy towards the functioning of the natural world. These three, seemingly unrelated topics have historically overlapped within the physical and social realm of city parks.

In contrast to traditional park play features, natural play spaces are playground like elements of parks or school yards that are uniquely positioned to address many of the challenges associated with increasing obesity, loss of social capital, and fewer connections to nature. In 2010 public health officials, researchers and concerned citizen set out to design and implement natural play spaces in communities throughout Northwest Minnesota with dual goals of promoting an increased sense of community ownership and promoting healthy, active lifestyles to curb disparate obesity rates. This case study examines the collaborative process between academic, local government, and community stakeholders in the planning, design and implementation of three natural play spaces in rural Northwest Minnesota and explores the ability of these types of spaces to foster social capital and provide a setting to improve community health through reconnecting people with nature.

3 BACKGROUND

Health problems associated with affluence are common among developed countries. Access to overabundant food along with increases in sedentary lifestyles have led to a suite of health problems associated with obesity: high blood pressure, high cholesterol, and diabetes. In the United States, rates of obesity and severe obesity, particularly from 2000-2010, have skyrocketed among all age groups and ethnicities (Sturm and Hattori, 2012). The daily activities of recent generations of children have also changed dramatically. Non-adult structured freeplay has been replaced with primarily indoor organized activities and media centered entertainment (Clements, 2004, p.68-80; Karsten, 2005, p.275-290; Hofferth and Sandberg, 2001, p.1-7). Younger age groups have historically been less prone to being overweight, however children are also suffering from the results of excessive caloric intake and reduced physical activity (Ogden et al., 2012). This trend is being experienced by adults and children alike, primarily in developed and developing countries that are more affluent (Flegal et al., 2010, p.235-241).

Increased indoor activities has decrease opportunity for community connections. Loss of community networks, norms and trust weakens community resilience. Trust is a vital factor in political and economic transactions. Television viewing, the aging "civic generation" (born 1926-1940), increased in women's labor force, and rising income inequality are suspect agents (Putnam, 1995, p.664-683; Costa and Kahn, 2001). In relation to health, Campbell (2001, p.182-196) argues there is a connection between health and social capital, yet there is still debate about the exact mechanisms. Government and other civic institutions can build social capital in communities (Warner 2001, p.187-192) and participatory community development can be an important method for accomplishing this (Dale and Onyx, 2005, p.1-10). Landscape architects have a long had a history of organizing community desires into shaping of local spaces (Hester, 1975; Lawson, 2007, p.119). These designs can enable communities to quickly take control of the shape of local spaces. This process also builds within communities the knowledge, community network, and trust necessary to address future design and planning issues. However, with completed designs in hand, communities are often left without the resources or knowledge to implement the planned works (Lawson, 2007, p.119-120). To address this issue, community designed open spaces are often self maintaining, low energy landscape, small scale, low cost, locally controlled and reflect values of the community (Francis, 1984, p.10). When community members spend their resources while engaging in the shaping of community spaces, wether those resources be time or money, cognitive dissonance theory indicates that they will likely feel an increased sense of value for the space as a result of their efforts and feel more user satisfaction (Francis, 1984, p.177; Sommer et al., 1994, p.174).

One activity common to past generations of children that engages the body and stimulates the mind is freeplay in nature. Health benefits associated with unstructured play in parks, woodlots and fields are being discovered (Hinkley et al., 2008, p.435-441; Kimbro et al., 2011; Wolch et al., 2010; Wheeler et

al., 2010, p.148-152) while at the same time this type of play is experienced less and less by children today. Parental concerns about dangers of crime, abduction, injury, and diseases perceivably associated with unstructured freeplay in nature combined with greater parental time constraints are primary reasons for this decline (Valentine and McKendrick, 1997, p.205-220; Veitch et al., 2006, p.383-393; Timperio et al., 2004, p.39-47). Community shaping and involvement in local spaces, especially those that involve gardening can be therapudic, especially for at risk populations (Pudup, 2008, p.1228-1240).

The creation of parcels of land developed with lighter touches of open space with grass, ponds and wooded fields within cities has afforded access to nature to residents of densely populated areas, access that historically was only available to the wealthy and powerful. Early proponents of these parks recognized the deep need that people have to be connected to nature and capitalized on this fact to create momentum for the establishment of these civic landmarks (Pregill and Volkman, 1993, p.423-463). Parks provide a setting for enhancing community health. Easily observed in parks is the engagement of physical activity; walking, running, cycling, and a wide variety of individual and team sports. In addition to the active uses of parks, they also provide settings for spiritual connections. A day spent in the energy intensive whirlwind of any large city juxtaposes the mental rejuvenation experienced in nature filled landscapes. When maintained well parks can serve as middle ground between communities, generations, connecting diverse neighborhoods, and fostering social capital. Numerous ecosystem services and ecological connections can be created, enhanced and restored in the open spaces and networks of parks.

There is tremendous diversity in the composition of parks, from heavily manicured to wild and wooly. However one common design theme in parks are the areas designated for children. Often designed for the benefit of adult guardians, children's playgrounds are often flat for unobstructed observation, free of excessive dirt, and filled with structures increasingly vetted for safety. However biophilia research suggests that the more engineered a park, the less beneficial to human health (Maller et al., 2002; Wells, 2006, p.1-24). To explore this primal connection to less structured nature, natural play spaces are reemerging (Hall, 1897) as a method for engaging children to improve health through physical activity and provide opportunities for less structured free play with natural materials in outdoor environments.

3.1 Project Description

This project was a result of collaborations begun at the Connecting Children and Nature information and networking conference held September 2010 in Crookston, MN. Staff at the University of Minnesota's Northwest Regional Sustainable Development Partnership and at the Polk County Public Health office began by identifying potential partners for the project. Engaging a broad range of partners helped to break down some of the traditional barriers that inhibit effective progress on such projects by increasing communication and understanding of the topic. These connections were crucial to local engagement and feedback, and to ensure that health improvement goals were being met.

Along with the social and community connections, assistance was needed with the design of the natural play spaces. This was addressed by horticulture and landscape installation faculty and students at the University of Minnesota Crookston (UMC). Additionally, researchers from the Center for Sustainable Building Research's Design for Community Resilience program at the University of Minnesota Twin Cities (UMTC) campus provided design assistance and community engagement expertise with graduate landscape architecture students from the College of Design's Landscape Architecture program. These partners comprised the "design team".

A series of weekly conference calls brought the diverse partners together to define the roles, responsibilities and goals of an integrated design process that included academics, public health officials, community service groups, early childhood educators, and designers. This integrated approach consisted of holding initial community meetings convened by County Public Health partners. A variety of methods were used to inform the public (Table 2). Invitations were sent to targeted individuals, city administrators, Early Childhood Family Education (ECFE) coordinators, daycare providers, doctors, family members, and community service clubs. Additionally, signs were posted at various community locations to publicize the event.

The first community meeting was an opportunity for everyone interested in the project to meet and to become familiar with the project, as a community member or one of the organizing partners. Additionally, it was an opportunity for the project partners to introduce the concepts that underlie natural play spaces. For inspiration and discussion, the partners showed local, national and global examples and

precedents. Participants were encouraged to share about their own experiences in nature, why they thought nature play was beneficial, as well as any fears or concerns they might have. Through a series of discussions and playful design exercises, the attendees shared their ideas and aspirations for the natural play spaces. Participants were organized into small groups and encouraged to come up with a schematic plan for the natural play space using base maps, sticky notes and markers and shared it with the other groups.

As part of the evaluation plan for the project conducted by a graduate student and guided by faculty in the School of Public Health, community stakeholders were invited to take a pre-survey that assessed their sense of community ownership, increased use of natural play spaces, and attitudes and belief around physical activity and connecting children and nature.

Over the course of the project, as the partners interacted with more communities, especially children from those communities in proactive involvement (Francis, 2002, p.162) a few tools were developed to facilitate the initial community design exercise. One of these was a booklet that described various natural play space elements, or modular features, such as mazes, climbing logs, sand mounds, or water flow features. Each entry in the booklet contained sample images, a brief description of the feature, the types of play or activity that it encouraged, the materials needed for its construction, and an estimate of the cost of installation. Another tool developed was a set of game pieces to utilize a collage method to planning (Francis, 2002, p.165). Each gamepiece symbolized one of the features listed in the booklet, and could be placed on the basemap like a board game. These tools provided easily-accessed technical information and increased the sense of play in the design of the play spaces.

The ideas, drawings, and layouts emerging from the initial community meetings were documented and organized, and then the design team (comprising landscape architecture and horticulture students guided by faculty researchers) integrated the ideas into a few possible design layouts. The design layouts were drawn to professional quality, rendered in color, and completed with annotations and scale. A second community meeting was held to present the layouts for critique, input, and suggestion. Using the results of this last meeting, the design team created the final designs that were to be installed (Figure 1).



Figure 10. Final plans for the natural play spaces (2011). Designs by Eric Castle, Bethany Jenkins, Kristen Murray, and Kristine Neu

As volunteer efforts were used, the installation of the natural play spaces was organized into two phases: preparation and installation. The designs were subdivided into modular features (previously mentioned as described in the booklet) which could be constructed by itself. Once all the features were completed the design would stand as a whole, yet until that point each feature could stand as a play feature on its own. Materials for each feature were acquired through donation, city sources, or were purchased. As many of the materials were tree based, connections with local arborists proved a valuable source of free materials. Lists of tools needed to construct each feature were compiled and collected. Individuals from community partner groups volunteered to serve as crew leaders during the volunteer workdays and received detailed written instruction on how to construct each feature. Volunteer workdays were planned and advertised using a variety of media (Table 2). As volunteers arrived to begin working, crew leaders would direct their efforts in the construction of features. This process was repeated until the modules were finished.

4 METHODOLOGY

No formal methods were used in assessing the effectiveness of the collaborative design of the natural play spaces. Establishing such a process would be important as the work continues. That said, the informal methods used to review effectiveness of the design during the process were as follows:

- Feedback and input to the collaborative design by members of the design team (horticulture and landscape installation faculty and students at the University of Minnesota Crookston (UMC) and researchers from the Center for Sustainable Building Research's Design for Community Resilience program at the University of Minnesota Twin Cities (UMTC) campus with graduate landscape architecture students from the College of Design's Landscape Architecture program).
- Feedback and input to the design and collaborative design by other partners including community representatives and city officials in weekly conference calls and in person. This input included discussion of practical implementation and maintenance of the design.

Moving forward, an approach to assess the effectiveness of a collaborative design for a natural play space could include: assessment of how the design addresses health, social and environmental benefits; assessment of how the design supports implementation and long-term maintenance; and assessment of changes made to design during implementation; assessment of user behavior on the site that indicates design effectiveness and suggests changes for future designs.

5 RESULTS AND DISCUSSION

Through community engagement during the process of planning, designing, installing and then disseminating this project impacted physical health, social capital, and connections to nature in the respective communities.

5.1 Health

The creation of three new play spaces for children has allowed increased outdoor play. Due to the modular nature of many of the features, activity by users is often evident through the manipulation of the pieces and parts. Reporting on regular visits, community stakeholders often remarked that the play features were constantly being used by children as evidenced through their changed locations. One example was a temporary life size maze constructed of straw bales, meticulously designed and placed according to the plan with consistently sized pathways and enough turns and dead ends to create interest. The day after the maze was finished the designer returned to the site to find that all the straw bales were relocated by users to form a terraced and walled enclosure.

Play in nature has many benefits like improved motor skills (Fjørtoft 2004, 21-44) and encourages more physical activity (Cooper et al., 2010, p.7; Hinkley et al., 2008, p.435-441; Wheeler et al., 2010, p.148-152) which reduces the likelihood of significant increases in BMI (Wolch et al. 2010). Exposure to and even mere viewings of nature increase manageability of childhood Attention Deficit Disorder and increases self discipline and self control (Taylor et al., 2001, p.49-63; Taylor et al., 2001, p.54-77). As children's home ranges have diminished (Karsten, 2005, p.275-290) the importance of locating nature

closer to where children live through building of natural play spaces in local parks can increase opportunities for interactions in nature, which are critical during middle childhood (Kellert, 2005).



Figure 11. Natural play space located in proximity of naturally managed open space. (2013) Image source: USDA, all other data created by author.

Location of the play spaces can have secondary impacts on encouraging physical activity. When play spaces are located near or connected to trail networks or undeveloped natural areas they can entice users to the vicinity then users can springboard into these adjacent amenities (Figure 2). This can reintroduce natural areas that are unknown to today's children. Throughout the project it was common for community volunteers, many in advanced stages of life, to comment on how the adjacent woods provided countless hours of entertainment and play and how they were excited at the prospect of helping children today have similar experiences.

Table 3. Partner roles in each phase of the project

	Planning Phase	Design Phase	Implementation Phase	Dissemination
Polk County Public Health	<p>Arranged local meetings with community partners - including all local media events surrounding. Arranged special community planning events. Contacted community partners for financial, strategic and implementation support. Convened local advisory councils related to project.</p>	<p>Convened local advisory councils related to project. Hosted events for community members and partners (from multiple backgrounds and multigenerational) to learn about natural play spaces, to dream big and get ideas on paper. Weekly meetings with design team.</p>	<p>Provided support to U of M with supplies. Hub for information distribution. Fiscal agent. Scheduled, arrangement and publicity of work days: schedule, media, food, water, some supplies, support systems (porta potty/water). Planned, arranged and publicized Grand Opening Celebration.</p>	<p>Participated in planning and implementation of natural play space workshop. Ongoing support and facilitation of Castle Park Natural Play Space Advisory Team in developing future programming</p>
U of M Center for Sustainable Building Research	<p>Provided explanation and examples of natural play spaces to community groups. Engaged community members in planning and design and compiled suggestions and feedback. Worked with UMC to create designs.</p>	<p>Worked with U of M Crookston to integrate community feedback into final design. Prepared material for client feedback meetings. Created game pieces used to gain community input.</p>	<p>Supported School of Public Health graduate student and faculty on developing an evaluation plan and pre-survey.</p>	<p>Presented "lessons learned" and ran breakout session at natural play space workshop. Assisted in efforts to publish work through scholarly venues.</p>
U of M Northwest Regional Sustainable Development Partnership	<p>Presented the NW RSDP's interests and rationale to putting a priority on connecting children and nature as essential to the goal of sustainability in the region.</p>	<p>Provided funds for student designers.</p>	<p>Cheerleader and helped to spread the word. Participated in the Grand Opening.</p>	<p>Connected University with design team reps, public health and others to hold natural play space workshop</p>
U of M Crookston	<p>Assisted and collaborated with community partners during planning meetings. Compiled, organized, and summarized community input into a design program</p>	<p>Coordinated design efforts of two design teams. Conducted meetings to facilitate stakeholder feedback on preliminary designs. Finalized stakeholder approved designs.</p>	<p>Created construction documentation, materials lists and process methodology to coordinate en masse volunteer work days. Procured construction materials and equipment. Directed volunteer efforts to implement designs.</p>	<p>Presented "lessons learned" and ran breakout session at natural play space workshop. Led efforts to publish work through scholarly venues.</p>
City governments	<p>Identified location for natural play space. Gained necessary approvals to move forward with planning.</p>	<p>Provided feedback on preliminary designs. Gained necessary approvals for final designs.</p>	<p>Financed purchase of materials. Directed city crews on preliminary work. Sourced materials and installation equipment.</p>	<p>Owner of site/ultimately responsible for maintenance and upkeep.</p>
Citizen advisory boards	<p>Ensured representative of stakeholders. Advise city gov/Park Board (governing body). Developed goals of the group and NPS efforts. Contacted potential supporters- financial, design, implementation.</p>	<p>Spread the word and participate in design workshops. Provide feedback on prelim designs. Seek input from others.</p>	<p>Volunteer at work days. Spread the word about work days. Assist with planning and grand opening activities. Participate in marketing efforts. Help find volunteers with specialty skills for work days. Guide work groups at work days.</p>	<p>Ongoing support and facilitation of Castle Park Natural Play Space Advisory Team including formation of Castle Park Natural Play Space Education Committee and ongoing planned educational events at Castle Park (CastleKids).</p>
Community partners (Rotary Club, Lions Club, early childhood groups, Jaycees, daycare providers, teachers, 4H)	<p>Assisted with financial planning needs as well as held fundraisers and letter campaigns.</p>	<p>Public Health presentations to community partners. Provided design feedback to Public Health staff.</p>	<p>Recruited volunteers for workdays. Served as crew leaders and volunteers on workdays.</p>	<p>Crookston Early Childhood initiative continues to support and discuss play opportunities in Crookston. Local service groups available for further clean-up/work days. Local media available and engaged in process.</p>

5.2 Social Capital

Responding to declining rates of decreased community connections, initial goals of the project were to foster community engagement that would result in increased community resilience. Additional goals of a community engaged in the common efforts of planning and designing the natural play spaces. To avoid a reoccurring situation where communities have a professionally designed space and little money or expertise to install or maintain the space once completed (Lawson, 2007, p.119-120), the project engaged community volunteers to install the natural play spaces and advisory boards were formed to guide the long-term maintenance. These steps have led to an increased sense of ownership among those involved in the project. Increased sense of ownership can contribute to the long term success of these spaces. Community engagement efforts were spearheaded by the Polk County Public Health office. This engagement was leveraged by their intimate knowledge of community culture and their connections within the communities.

Table 4. Community outreach efforts through a variety of communication outlets

	year		month																		
	2011	2012	6	7	8	9	10	11	12	1	2	3	4	5	6	7	8	9	10	11	12
Castle Park, Crookston, MN																					
community event booth					1	3				1		1						1			
newspaper release				1	1							1	1	3			1	1			
radio spot						1						1	1	20				1			
flyer												1	1	1				1			
community presentation		1		1						1		1	2	1				1	1		
social media														3	1	1	1	1	1	1	
advisory board meeting												1	1	1	1			1	1		
Island Park, Warren, MN																					
community event booth																					
newspaper release						1															
radio spot																					
flyer																					
community presentation			1																		
social media																					
Mason Park, Fertile, MN																					
community event booth											1		1					1			
newspaper release												1	1			2	1				
radio spot																1					
flyer																1					
community presentation												1	1			1					
social media														1		1					

Table 1 illustrates the methods and timing of community engagement efforts. Success of these engagement efforts in the communities of Crookston, MN (pop. 7,891) and Fertile, MN (pop. 842) is highlighted by the total hours (750 and 250, respectively) spent by community volunteers on the planning, design, and implementation of the natural play spaces. As Sommer (et al., 1994, p.174) found, this willingness to spend time and physical effort is clear evidence of increased sense of ownership and is favorable to the long term success and utilization of the play space.

The project also provided initiative to erode institutional barriers commonly found in communities. Disconnect between academia, the public and various scales of governmental can lead to ineffective efforts, mistrust and unhealthy competition. When united in a common project these groups can effectly synergize with positive results. Reaching out to a variety of stakeholders at the onset of the project led to

successful goal setting and realization of the project aims. Efforts were divided among community partners according to interest and ability. Table 2 outlines the efforts engaged by the wide variety of community partners during the various stages that culminated in the successful installation of three natural play spaces.

Engagement efforts through social media and web based venues spread interest well beyond the physical geography of the project communities. As a result of this interest in reconnecting children to nature, a workshop was held to advise interested groups from other Minnesota communities on how to develop a similar process. This day long workshop helped officials from state parks, state natural resource agencies, school groups, academics, and concerned citizens to build upon the methods used in this project and strengthened community connections at a wider, regional scale. Each of the original community partners on the project also contributed to the dissemination of the project (Table 2).

Additional evidence that this project strengthened community relationships was provided by observation that other civic groups are mimicking the project methods. At the end of 2012 a group interested in redevelopment of neglected city spaces consulted with partners of this project to find ways to emulate the success found by collaborating with a wide range of community groups. Consultation with this group is ongoing.

The primary goals for the design team were to provide planning, design and implementation services to the various communities involved. Once completed, the hope was that sufficient community ownership would allow the design team to step back and let each community guide further development and management of the play spaces. As the play spaces were completed summer 2012, it may be too soon to evaluate if this goal was met. However initial results are positive, with Citizen Advisory Boards having met multiple times in the Winter 2013 to discuss the upcoming plans for summer 2013. These efforts have resulted in a significant number of well attended community events that utilized the natural play spaces as a focal point of the event. As Dendy found (1998, p.126) the formation and activity of the advisory committee significantly adds to the increase in community social capital.

Any park or greenspace can provide the setting for physical activity that reduces BMI, but for very little investment, natural play spaces can provide increased parental buy-in or a community sense of ownership because of parental involvement in the process, which can potentially mitigate parental concerns about safety (Valentine and McKendrick, 1997, p.205-220).

5.3 Connections to Nature

One striking difference that natural play spaces have when compared to traditional playground equipment is the use of natural materials. In addition to the low cost of these play materials logs, branches, straw, soil, rocks, and sand offer a variety of opportunities for exposure, familiarity and education. Material composition of rocks and physical deformations can be used to teach natural history and geology. Many of the boulders used in this project had striations that tell the story of immense pressure and power of this regions glacial past. Local sand can stir visions of waves lapping the shores of vast ancient inland lakes. As the organic matter in logs and straw begin to decay there can be direct observation and contact with the organisms and processes of this essential ecosystem function. This decomposition contributes to soil carbon and feeds soil building organisms. As the play functions of these materials decay along with the cell walls, there is opportunity for reinvention of the space; new opportunity to rebuild community connections to revitalize the play space and social capital.

From a long term perspective, play in nature can impact environmental health. Experience in nature is significant in forming an affinity towards the environment in children (Cheng and Monroe, 2010, p.31-49) adolescents (Müller et al., 2009, p.59-69) and adults (Chawla, 2006, p.57-58). Socialization in nature, direct unstructured contact with nature, and volunteering in nature were experiences that natural history professionals had in common (James et al., 2010, p.231-256). Hence the more connections to nature as a youth, the more likely adults may be to make pro-environment choices.

6 CONCLUSION

Benefits of a socially engaged method in the creation of natural play spaces include a the synergistic effect on a range of community health issues. Through this project exciting play spaces were built that entice children outdoors to be physically active and increased physical activity reduces the probabilities of a suite of health maladies, both of the mind and body. Involving the community in the process of planning through to implementation forged familial bonds as well as community networks and

trust. There was room for all age groups to meaningfully contribute to this efforts. Grandparents helped a rising generation rediscover the joy of unstructured freeplay. Generation's X & Y were able to make meaningful contributions to the cause of making a better community and helping kids connect with nature. Children, equally involved in the planning and installation processes were able to built stick forts, shape earthen mounds, create mud pies and laydown pathways of log slices, which they dubbed "tree cookies". Continued programming efforts, led by a community oversight committees sustained involvement, will guide future engagement and strengthen the increased social capital gained by communities throughout this project. Institutional barriers, so often restricting and inefficient, were broken down through collaborative efforts in a united purpose. When children play in these spaces, engaging with the piecies and parts of natural materials, they feel and smell the soil, interact with the critters that habitate therin, and hopefully create lasting memories. Thus the creation of natural play spaces, through a community involved process is an effective method for improving physical health, community vitality and knowledge of and connection to the natural world.

Future research opportunities can include more quantitative and qualitative measurements that can more fully explore the relationships of health, social capital, and environmental stewardship examined in this case study. Additional aspects to focus on can include the long term involvement of community members in the reshaping of the space as the construction materials naturally decay and relationship of the original design and the long term maintenance.

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