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Measuring social capital among youth: applications in environmental education

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Although critiqued for circular reasoning and lack of definitional and analytic clarity, social capital has garnered widespread interest in two areas relevant to environmental education (EE): the impact of family and community-level social capital on positive youth development and of community-level social capital in fostering collective action to manage natural resources. Although EE is normally considered for its value relative to environmental outcomes or natural capital, intergenerational, community, and other approaches to EE may also foster social capital. Drawing on Putnam's definition of social capital, which emphasizes civic engagement, we developed and tested for reliability a survey to measure cognitive and structural attributes of social capital among youth. We conclude that although several attributes of our instrument are useful for use with youth aged 10–18 years in EE contexts, much more work needs to be done on conceptualizing and developing measures of social capital that are relevant to EE. Further, we suggest that social capital presents a framework for how EE programs can bring youth and adults together to create the conditions that enable collective action, as a complement to ongoing work in EE focusing on individual behaviors.

Keywords: social capital; survey development; civic engagement; youth development; collective action

Introduction

The notion of social capital has garnered both interest and disdain on the part of social scientists. As a construct with multiple definitions spanning multiple disciplines and levels of analysis, and which can be used normatively as well as analytically, social capital has widespread appeal and enables 'exchanges, collaboration, and debates across disciplines in ways that are often unusual' (Castiglione, van Deth, and Wolleb 2008b, 6). At the same time, concerns are raised about whether social capital should be conceived of and measured as an individual attribute, a community attribute, or both (van Deth 2008). Further, Portes (1998) raised the issue of circular reasoning in discussions of social capital. Is social capital a cause of societal good such as lower crime rates or higher education levels (or of societal bad such as cohesiveness among gangs)? Or is social capital an outcome of social institutions such as good policing and education systems?

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Within the vast literature on social capital, two areas are of particular interest to environmental education (EE). First, a large number of studies have linked social capital to a suite of positive youth development (cf. Eccles and Gootman 2002) outcomes (see Ferguson 2006 for a systematic review). Although youth development outcomes have not always been considered important in the field of EE, which has emphasized environmental outcomes or natural capital (cf. Reid 2005), an increasing number of EE practitioners are focusing on integrating community concerns into their programs as reflected in the *Guidelines for Excellence in Community Environmental Education* (Price, Simmons, and Krasny, forthcoming). In particular, youth development outcomes are consistent with EE programs that emphasize educational achievement (Ernst and Monroe 2004), community well-being (Price, Simmons, and Krasny, forthcoming), environmental action (Schusler and Krasny 2010), intergenerational relationships (Ballantyne, Connell, and Fien 2006), social-ecological systems resilience (Krasny, Lundholm, and Plummer 2010), and civic ecology practices (Krasny and Tidball 2009b), among other EE approaches. A second area of scholarship relevant to EE are studies demonstrating that social capital fosters collective action, including community-based management of common property natural resources (Ahn and Ostrom 2008; Ostrom 2000; Pretty and Smith 2004; Pretty and Ward 2001). Given that environmentally-sound resource management is a goal consistent with EE, a conceptual model that incorporates social capital coupled with collective action offers an alternative to individual behavior-focused models in EE, which have been questioned based on the tenuous relationship of knowledge to behaviors, and on the complexity of incorporating the myriad factors that may influence individual behaviors (Hungerford and Volk 1990; Kollmuss and Agyeman 2002; Steg and Vlek 2009). Interestingly, in addition to providing a rationale for consideration of social capital in EE scholarship and practice, these two areas – social capital's role in fostering youth well-being and in facilitating collective stewardship action – also reflect the problem of circular reasoning raised by Portes (1998). Are we interested in social capital as an outcome of EE, or as a property of groups engaged in EE that helps them achieve their goal of improving the environment? Alternatively, we might pose the question: What conceptual models for EE incorporate social capital, both as a program outcome valuable because of its relationship to various social goods, and as an attribute of some EE programs that facilitates collective environmental action?

While recognizing issues related to circular reasoning, as well as to multiple definitions and levels of analysis, social and political scientists maintain that social capital has value as a tool for understanding processes and outcomes within social systems (Castiglione, van Deth, and Wolleb 2008a). For this reason and because of social capital's relevance to EE, we developed and assessed for reliability a measure of social capital among youth ('youth social capital') that could be used in EE programs. Prior to describing the development and testing of our measure, we present an overview of the literature about social capital focusing on four areas: the history and definitions of social capital, its relevance to EE, measurement challenges, and measurement approaches in studies of children and youth. In short, the dual goals of this paper are to: (1) help the reader understand social capital and how it might be relevant to EE, and (2) present a preliminary measure for assessing social capital outcomes of EE programs that can serve to stimulate further conceptual and analytic consideration of social capital in EE. Note that no single paper can attempt to present a comprehensive review of the social capital literature; for that we suggest

edited volumes such as *The Handbook of Social Capital* (Castiglione, van Deth, and Wolleb 2008a) or *Foundations of Social Capital* (Ahn and Ostrom 2003).

Social capital: history and definitions

Scholars have traced the first use of the term social capital to West Virginia State Supervisor of Rural Schools Lyda Hanifan, whose early description bears striking similarity to use of this term by some contemporary scholars. Writing in 1916, Hanifan states:

> In the use of the phrase social capital I make no reference to the usual acceptation of the term capital, except in a figurative sense. I do not refer to real estate, or to personal property or to cold cash, but rather to that in life which tends to make these tangible substances count for most in the daily lives of a people, namely, goodwill, fellowship, mutual sympathy and social intercourse among a group of individuals and families who make up a social unit, the rural community, whose logical center is the school. (130)

Hanifan goes on to describe how a rural community can accumulate social capital through such means as 'public entertainments, "sociables," picnics and a variety of community gatherings,' and 'then by skilful (*sic*) leadership this social capital may easily be directed towards the general improvement of the community well-being' (131). In words that were to be echoed in Robert Putnam's popular book *Bowling Alone*, published 84 years later, Hanifan laments:

> That there is today almost a total lack of such social capital in rural districts throughout the country need not be retold in this article. … The important question now is, 'How may these conditions be made better?' (131)

Hanifan concludes by describing how various social activities through which rural people accumulated social capital led to them successfully advocate for a public good (road improvements). 'The more people do for themselves the larger will community social capital become, and the greater will be the dividends upon the social investment' (138).

Whereas the term 'social capital' appeared fleetingly in the literature following Hanifan's early work, the first systematic treatment of the concept did not appear until the 1980s (Castiglione, van Deth, and Wolleb 2008b). Bourdieu (1985) used the term to describe the ability of an individual to secure benefits (e.g. job and college admission) through membership and investment in social networks. Thus, parallel to how individuals gain advantage through wealth (financial capital) and abilities (human capital), Bourdieu's definition of social capital suggests that individuals can gain advantage through participation in various social structures, and thus social capital is a means of passing on privilege. Several years later, Coleman (1988) not only focused on social capital as an individual attribute, but also on its community-level outcomes. He conducted multiple studies of the behavior of tight-knit groups such as Catholic schools and New York City diamond merchants, and concluded that social networks or structures, in addition to conferring individual advantage, help to reinforce social norms that foster pro-social behaviors in communities (Coleman 1988). Putnam (1995) expanded on this notion of community benefits to explore the role of social capital in civil society and democracy more

broadly, drawing from French observer of nineteenth century America, Alexis de Tocqueville, who spoke of voluntary associations as 'schools of public spirit and civicness' and of democracy, which helped people recognize social obligations (Castiglione 2008, 179). Putnam and fellow researchers have claimed that social capital manifests itself in features of social organization, including networks, norms, social trust, and civic engagement, which pervasively influence our public life as well as our private prospects (Portes 1998; Portes and Landolt 2000; Putnam 1995), including crime rates, performance of civic institutions, longevity (Lochner, Kawachi, and Kennedy 1999), and drop-out rates (Coleman 1988). In short, similar to the early descriptive work of Hanifan (1916), the work of Putnam and other recent scholars of social capital would suggest that creating the conditions for community- or regional-level social capital to accumulate will have important benefits for community well-being and more profoundly, the ability of a democracy to function.

Whereas Putnam and other social and political scientists have focused on the relationship of social capital to social goods such as education, natural resources scholars have suggested that communities with higher levels of social capital and its components (e.g. social cohesion, Uzzell, Pol, and Badenas 2002) are more likely to act for the collective good around issues related to environmental management and sustainability, and to be resilient, i.e. have the capacity to learn and adapt to environmental change (Adger 2003; Agrawal and Monroe 2006; Dale and Onyx 2005; Ostrom 2000; Plummer and FitzGibbon 2007; Pretty and Smith 2004; Pretty and Ward 2001; Sirianni 2009; Sobels, Curtis, and Lockie 2001; Thoyre 2011; Walker and Salt 2006). Delving deeper, Ahn and Ostrom (2008) defined social capital as 'a set of prescriptions, values, and relationships created by individuals in the past that can be drawn on in the present and future to facilitate overcoming social dilemmas' (73). These authors described social capital as consisting of three components: trustworthiness, social networks, and institutions. They used game theory to explore the conditions under which individuals come to trust each other and thus behave in ways that generate mutual benefits, and examined the effects of social networks and institutions on facilitating collective action. Importantly, the work of Ostrom and others on the conditions that enable the management of common property to create public goods offers an alternative to Garrett Hardin's tragedy of the commons, which assumes that, in the absence of external controls such as regulation, incentives, and privatization, individuals always act in their own self-interest, which inevitably leads to environmental destruction (Ahn and Ostrom 2008).

In addition to improving environmental quality, organizations engaged in local natural resource stewardship (a form of collective action) may help build social capital among participants and their wider communities (Benn and Onyx 2005; Klyza, Isham, and Savage 2006). Thus, we return to the 'chicken and egg' critique: Is social capital a cause or a result of collective action? A way around this problem is to accept that social capital does in fact create the conditions that make possible collective actions, *and* that such collective actions foster additional social capital; one focus of studies then becomes to measure any additional social capital created by the collective action or the public good that result from such action (Hooghe 2008). So for example, trustworthiness makes possible collective action around environmental stewardship, and engaging in environmental stewardship may further increase levels of trustworthiness. Whereas the notion that social capital might be both a contributor to and an outcome of collective action creates confusion, it is

consistent with non-linear or systems ways of thinking (Selman and Knight 2006) that emphasize complexity. Applying such notions to environmental management and education, Tidball and Krasny (2011) have postulated virtuous cycles of civic engagement in greening and environmental learning that produce green infrastructure and ecosystem services, leading to greater opportunities for learning, generating social capital, and civic greening. Notably, systems thinking is also considered an important element of EE (Sauvé 2005; Sterling 2003, 2010).

Social capital's relevance to EE

Not all EE programs would be expected to generate social capital among participants (e.g. classroom instruction). However, some forms of EE may in fact foster social connectivity, trust, and associational and volunteer involvement, which are all components of the civic engagement or democratic tradition in social capital (Putnam 1995; Roper Center for Public Opinion Research 2000). More specifically, EE programs that incorporate collective opportunities for volunteer and associational involvement around stewardship (e.g. community gardening and tree planting), as well as those that incorporate opportunities for intergenerational learning and collective decision-making, would directly enhance associational involvement through the very nature of the activities, and may create opportunities for building trust. Thus, in this section we explore three arguments for linking social capital and EE research and practice, including: (1) the need to adapt programs to address youth development and other outcomes of interest to low-income urban and other stressed communities; (2) the ability of social capital to expand on existing work in participatory, emancipatory and related approaches to EE; and (3) the role of EE and social capital in collaborative natural resources management that leads to resilient social-ecological systems (See also Figure 1 for hypothesized relationship of social capital to EE, youth development, ecosystem services, and social-ecological systems resilience).

A large number of empirical studies and descriptive reports have linked indicators of social capital at the individual youth (e.g. participation in civic activities or after-school programs), family (e.g. family structure and quality of parent-child relationship), and community level (e.g. social support networks, civic engagement in local institutions, trust, and safety) to a suite of positive outcomes for youth, including reducing adolescent pregnancy, delinquency, school failure, and child maltreatment, as well as enhancing happiness, health, high quality relationships with adults, and the ability to run meetings and other civil society skills (Bettertogether 2000; Helve and Bynner 2007; Ferguson 2006; Jarrett, Sullivan, and Watkins 2005; Lewis-Charp et al. 2003; Rossteutscher 2008). Given growing interest in the role of EE in fostering youth well-being in urban, poor, and other stressed communities (Chawla 2001; Krasny et al. 2013; Kudryavtsev and Krasny, in review; Louv 2006; Price, Simmons, and Krasny, forthcoming), social capital linked to positive youth development provides a conceptual and analytical lens for EE oriented toward such community outcomes.

Because social capital incorporates notions of civic participation and connecting with other youth and adults, it also provides a conceptual and analytic lens for additional EE approaches that address social concerns. These include intergenerational learning (Ballantyne, Connell, and Fien 2006; Duvall and Zint 2007), place-based learning (Sobel 2004), environmental action (Schusler and Krasny 2010), school-community partnerships for sustainability (Guevara et al. 2001), social learning

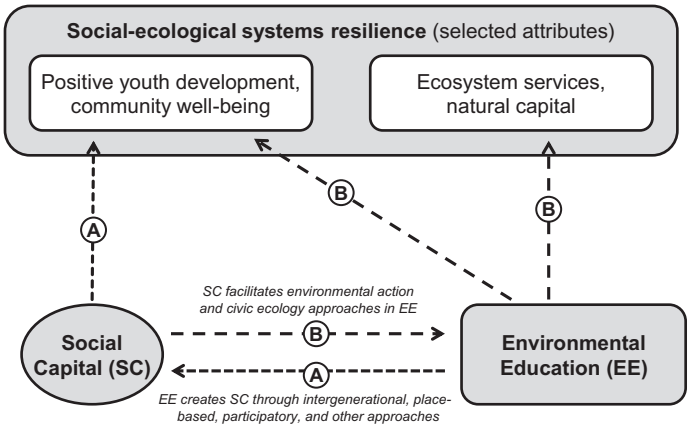

Figure. 1. The relationship between environmental education, social capital, and social-ecological systems resilience (adapted from ideas expressed in Ahn and Ostrom 2008; Ballantyne, Connell, and Fien 2006; Eccles and Gootman 2002; Jensen and Schnack 1997; Krasny and Tidball 2009b; Putnam 1995; Reid et al. 2008; Walker and Salt 2006).
Notes: Pathway A: EE programs, in particular those using intergenerational, participatory, community, and place-based approaches, may create social capital, which in turn leads to positive youth development and community well-being.
Pathway B: Social capital facilitates collective action in environmental action and civic ecology approaches to EE, which in turn enhance ecosystem services and natural capital.
Community well-being, ecosystem services, and natural capital are components of resilient social-ecological systems.

(Wals 2007), social-ecological systems resilience (Krasny, Lundholm, and Plummer 2011; Krasny and Tidball 2009b), community-based natural resource management-EE (Monroe and Allred 2013), and action competence and other forms of participation (Hart 1992; Jensen and Schnack 1997; Læssøe and Krasny 2014; Læssøe and Pedersen, forthcoming; Reid et al. 2008).

Civic participation is not only a focus of action competence and related forms of EE; it is also closely linked to Ahn and Ostrom's (2008) notions of collective action to manage public goods. Similar to work in natural resources management, feedback mechanisms among individual- and community-level social capital, collective action, and individual, community and environmental outcomes are embedded in some forms of EE. For example, an intergenerational EE program might create social connectivity (cf. Ballantyne, Connell, and Fien 2006), which in turn may lead to collective action around environmental management (e.g. preserving a natural area), creating further trust (cf. Hooghe 2008). EE also includes programs that directly incorporate collective action (e.g. water quality monitoring and related advocacy), which may build and incorporate social capital components such as trust, volunteering, and associational involvement (e.g. in watershed associations). Even in cases where youth initially join in stewardship activities for reasons unrelated to an interest in the environment, for example, to obtain a required service learning credit or escape from violence in their home, through participation in environmental and community stewardship they may create trusting relationships and further their voluntary involvement.

Importantly, consideration of how social capital might create the conditions for collective action offers a framework for EE that shifts the focus from changing individual behaviors to creating the conditions that enable a community to take action to safeguard its natural resources. Harking back to Hanifan's original work on social capital, it is noteworthy that the school superintendent did not attempt to directly change the behaviors of rural community members. Rather he organized a series of social and other events over a period of time that created social connections, trust and other elements of social capital, which in turn led to residents becoming substantively involved in advocacy and other actions to improve community well-being. Similarly, environmental educators might want to consider how programs can serve to bring youth and adults together to create the conditions that enable collective action, as a complement to ongoing work focusing on individual behaviors.

Challenges and issues in measuring social capital

Before describing specific measures of social capital relevant to EE, we address four challenges that confront any study of social capital. These challenges relate to: (1) clarity of the construct, (2) level of analysis, (3) multidimensionality, and (4) contextual factors such as age and culture.

Clarity of the construct

In addition to Portes' (1998) concerns about correlation and causation, questions center around whether social capital is a quantity similar to financial capital, or a process of social interaction leading to constructive outcomes (Bankston and Zhou 2002). Bridger and Luloff (2001) expressed concerns about the instrumentality of social capital and the absence of a clearly specified relationship between social capital and broader definitions of community that also emphasize reciprocity, trust, involvement, and shared norms. Further, the whole notion of capital has been accused of wrongfully assuming static assets that can be lost, gained, or traded. A more useful metaphor in the context of EE may be multiple future societal and environmental options; a focus on options facilitates opportunities for open-ended learning as opposed to capital, which implies consumption that may limit future possibilities (Winnett 2005).

Similar discrepancies cause confusion in the social capital and youth development literature. In addition to using multiple definitions of social capital (e.g. Jarrett, Sullivan, and Watkins 2005), studies cite civic engagement as a measure of social capital among youth (Bettertogether 2000) and as contributing to the development of youth social capital (Jarrett, Sullivan, and Watkins 2005). Further, authors variously refer to youth social capital as a positive outcome of programs that youth can access so as to enhance their success in life (i.e. youth as consumers of social capital), and a process whereby youth produce something of value for society, and in the case of EE, for the environment (i.e. youth as creators of social capital, Morrow 2000; Schuller 2007; Tolonen 2007).

Level of analysis

Various scholars have conceived of and developed measures for social capital as an attribute of individuals, families, and communities (van Deth 2008). Further, when

conceived as a community attribute, social capital has been measured as an aggregate of multiple individual-level measures (e.g. levels of church going or public participation), and as a measure of community-level processes such as density of volunteer organizations. However, studies that aggregate individual data, for example, total participation in organizations, may reveal little about the nature of that participation (Harper 2001). Quasi-experiments also have been used as a measure of community-level social capital, for example, by determining how fast a 'lost' child is responded to or a 'lost' wallet is returned (van Deth 2008).

Multidimensionality

Similar to studies of other phenomena relevant to EE (e.g. environmental quality and learning), social capital research uses multiple constructs. Van Deth (2008) reviewed the major measures and associated data collection methods for cultural and structural aspects of social capital conceived of as individual and collective features. Cultural aspects, defined as trust and civic norms and values, are measured by surveys of trust in other people and institutions, norms of reciprocity, and democratic attitudes, as well as using game theory and other experimental approaches. Structural aspects, defined as networks or contacts, are measured by surveys of membership in associations, volunteerism, ego-centered social networks, and number of children in household, as well as community studies and observations of voluntary associations, among others. According to van Deth (2008), mixed methods studies combining surveys of individual attitudes and perceptions with experiments are rare and restricted to studies of trust or trustworthiness.

Example measures that reflect the diversity of social capital constructs include: parents present and focusing on positive relationships with their children and the number of times a family moves as an indicator of norms enforced by non-family adults in the community (Coleman 1988); civic engagement and leadership, participation in the political process, and trust across racial lines (Kennedy School of Government 2012); trustworthiness, networks, and institutions (Ahn and Ostrom 2008); social relations, group membership, civic participation, reciprocity and trust, social networks and support, and views of the local area (Harper 2001; Whiting and Harper 2003); and qualitative measures of networks, shared values and shared understanding, and social norms (Plummer and FitzGibbon 2007). Further, studies have shown that different components of social capital may have different relationships to variables of interest (Furstenberg and Hughes 1995, Miller and Buys 2008). Issues related to which constructs to measure reflect the fact that social capital attempts to incorporate both cultural or cognitive (trust, expectations of reciprocity, civic, or social norms, and values) and structural (associational involvement and networks) aspects (Harpham, n.d.; van Deth 2008). Echoing the discussions about feedbacks above, structural components of social capital may facilitate cultural components, which in turn may foster cooperation (van Deth 2008).

Contextual factors

Suitable measures for social capital constructs such as trust, associational involvement, volunteering, and political participation may differ depending on age (Deviren and Babb 2005) as well as on cultural, political, class, gender, and racial/ethnic norms and inequalities in particular societies (Morrow 2000; Whiting and Harper

2003). For example, youth may be less likely than adults to trust strangers or other adults in their neighborhood, not make choices about religious and associational involvement, be ineligible to vote, and may define community by those with whom they interact rather than geographically (Morrow 2000). Whereas in some countries, youth may be limited in the potential for volunteering, in Western countries service-learning requirements and other cultural expectations encourage volunteer engagement.

Measures of social capital among children and youth

Most youth studies have not measured social capital of youth directly but rather used structural measures of family and adult social capital as an indicator of youth social capital, and view social capital as a means for parents and other adults to confer benefits on children (e.g. Coleman 1988; Davison et al. 2012). For example, Runyan et al. (1998) measured social capital as presence of two parents in the home, social support of maternal caregiver, no more than two children in family, neighborhood support, and regular church attendance.

Fewer studies have focused on measuring social capital among youth themselves. In one example, a survey study comparing social capital in youth age 16–24 years and in adults, Whiting and Harper (2003) drew from the OECD (2001) definition of social capital, which includes networks, shared norms, values, and understandings that facilitate cooperation. The survey items focused on neighborliness, reciprocity, civic engagement, enjoying living in the area, friendship and relative networks, and social support. In a separate study of 12–15 years old youth, Morrow (2000) drew from Putnam's ideas about social capital and used a suite of qualitative methods including written accounts of out-of-school activities, map drawing and photography, and group discussions exploring community and institutional participation and use and perceptions of neighborhoods. Raffo and Reeves (2000) integrated cognitive and structural measures of social capital and used semi-structured interviews of youth to investigate experiences of schooling, educational and employment opportunities, and leisure activities, among other factors. They presented the notion of an 'individualized system of social capital,' i.e. a constellation of social relations with the young person at the core that provides authentic opportunities for everyday learning.

Other qualitative studies focus on the processes by which social capital develops among and impacts youth. For example, a report produced by a group affiliated with Robert Putnam describes how activities in schools, youth organizations, and families might foster youth civic engagement (Bettertogether 2000) and another report details how engagement in civic activism promoted a suite of youth development outcomes, including high quality relationships with other youth and adults and opportunities for participation and leadership (Lewis-Charp et al. 2003). Jarrett, Sullivan, and Watkins (2005) conducted a qualitative study of how youth develop meaningful connections with adults through participation in after-school and summer programs focused on the arts, farming, and civic activism.

Study purpose and methods

The purpose of the empirical work reported in this paper was to develop and test for reliability a measure of social capital among youth ('youth social capital') that could

be used in EE. This section outlines the methods we used in developing a youth social capital measurement instrument. Although the focus of this paper is not on measuring the outcomes of EE on social capital, after presenting the results of developing and testing the instrument, we also report on a short preliminary study in order to demonstrate what can be learned from applying the instrument we developed.

Social capital measure chosen

While recognizing the wide range of social capital traditions, we chose to draw from definitions and measures used by Putnam (1995), who defines social capital as 'features of social organization such as networks, norms, and social trust that facilitate coordination and cooperation for mutual benefit' (67). The focus on 'civic' attributes of social capital, including civic engagement, social connectivity, and trust (Kennedy School of Government 2012), is consistent with values and processes embedded in civic ecology and community approaches to EE, which emphasize individual, community, and environmental outcomes through hands-on, self-organized stewardship, and other activities often in stressed communities (Krasny and Tidball 2009b; Krasny and Tidball 2012; Price, Simmons, and Krasny, forthcoming).

Survey development

We developed a survey using five-point Likert scales and dichotomous (yes/no) questions related to five social capital constructs. The constructs and types of scales were drawn from the National Social Capital Benchmark Survey, which has been used and adapted for numerous studies of social capital among adults in communities across the US, with results aggregated to provide a regional measure of social capital (Kennedy School of Government 2012). In developing a measure of social capital suitable for use among youth aged 10–14 years, we began with 11 constructs or domains used in the National Benchmark Survey, including social trust, interracial trust, diversity of friendship network, civic leadership, associational involvement, faith-based social engagement, equality of civic engagement across the community, informal socializing, giving and volunteering, conventional politics participation, and protest politics participation. We then narrowed the constructs down using the following criteria: (1) constructs relevant to potential outcomes of EE programs that encompass interactions with others and the environment, and (2) constructs suggest activities that youth commonly engage in and for which engagement is at least partially determined by youth themselves. Using these criteria, we decided to include: social trust, informal socializing, diversity of friendship networks, civic leadership, and associational involvement, and eliminated faith-based engagement, giving and volunteering, conventional politics participation, protest politics participation, and equality of civic engagement. We also eliminated interracial trust because the authors believed that multiple questions about race might reinforce at-times counter-productive societal notions of differences based on racial categories, which do not necessarily apply within the multicultural settings in which we were working (e.g. mixed race youth or immigrant youth from the Dominican Republic who vary widely in skin color).

After choosing these domains, we examined the questions that defined these constructs in the full-length 2000 National Social Capital Benchmark Survey (Roper

Center for Public Opinion Research 2000). The number of questions per construct varied from 7 to 18 on the Benchmark Survey, which has been administered in large-scale studies using telephone-based methods. Given the difficulty of contacting youth by phone, and that the questions we identified lent themselves to written responses (i.e. Likert scales and dichotomous 'yes/no' answers), we felt it appropriate to use a written survey. We limited each construct to five or six questions in order to make the survey usable by youth.

We adapted for a younger audience a subset of questions for each construct from the National Benchmark Survey. In some cases, we simply changed a word or two so that the language would be more accessible by youth. In other cases, such as associational involvement and civic leadership, we adapted questions focused on adult activities to reflect activities accessible to youth (e.g. engagement in student councils and sports teams). For each of the five constructs, we strove to maintain the overall meaning, even though the questions were changed. An academic specialist in childhood development reviewed the constructs and the related questions several times during the survey creation process to help ensure that the content was age appropriate.

To further assess understandability of the question wording, a preliminary version of the survey was administered to seven boys and two girls ages 14–18, who were serving as summer apprentices in a children's gardening program in Ithaca NY (nine youth total). After completing the paper-based survey, the youth discussed their understanding of the questions, which led to minor revisions of items to make them more understandable. Based on the results of these pilot tests, the final survey included two constructs using five-point Likert scales, each with five items addressing that construct (social trust and informal socializing), and three constructs administered as a series of dichotomous questions related to different activities that reflect these constructs (diversity of friendships, associational involvement, civic leadership, Table 1). The use of Likert scales and dichotomous questions is consistent with the measuring approaches used in the National Benchmark Survey for these constructs.

In November 2009, we assessed the utility of the social capital survey using a national online survey of 210 randomly selected children aged 10–14 (52% male, 48% female) administered through Zoomerang, a survey service that allowed us to quickly reach a sufficiently large respondent pool. The social capital questions were administered as part of a larger survey that also tested items related to youth place meanings and attachment (Kudryavtsev, Krasny, and Stedman 2012).

Example application: survey pilot implementation in the Bronx

To test the use of the survey, we implemented it in an evaluation of the impact of summer urban EE programs on social capital among youth in the Bronx, NYC. Based on closer examination of the responses to the Zoomerang survey described above and further reflection among our research group, we made several minor changes to the wording of questions in the original survey. We also replaced the diversity of friendship dichotomous answers with a five-point Likert scale ('strongly disagree' to 'strongly agree') because we thought Likert scale answers would provide more nuanced responses for these questions than dichotomous answers. (We did not have an opportunity to test this Likert scale for reliability using a national survey.) The purpose of describing this pilot study is to illustrate an application of the survey, rather than to suggest major results.

Table 1. Social capital survey questions and results of reliability tests from Zoomerang survey.

Social capital constructs, and survey items	Type of measure, internal reliability	Mean score
Social Trust Please indicate the level of your agreement with these statements about your relationships with other people in your community: (from 1 = strongly disagree to 5 = strongly agree) (1) In general, I can trust most people. (2) I do not trust people in my neighborhood. [reverse coded] (3) I trust people I go to school with. (4) I trust people I hang out with. (5) I do not trust the police in my neighborhood. [reverse coded]	Likert scale, alpha = 0.64	3.74
Informal Socializing How often do you… (from 1 = never to 5 = very often) (1) Have friends over to your home? (2) Attend a celebration, parade, or art event in your community? (3) Attend a local sports event in your community? (4) Visit relatives in person or have them come visit you? (5) Hang out with friends at a park, shopping mall, or other public place?	Likert scale, alpha = 0.74	2.88
Diversity of Friendship Please check all that apply to you: (1 = yes, 0 = no) (1) I have close friends that are all ages, not just my age (2) I have close friends who are other races than me (3) I have close friends who have other favorite interests than me (4) I have other close friends who go to other schools than me (5) I have close friends who are from other countries (6) I have close friends whose families have more money or less money than my family	Dichotomous scale, KR-20 = 0.71	0.59
Associational Involvement In what kinds of education programs do you currently participate? (Check all that apply to you) (1 = yes, 0 = no) (1) An after-school program (2) A youth club such as a Boys and Girls Club, Scouts, or a 4-H club (3) A community service club	Dichotomous scale, no reliability test because items discrete	0.22

(*Continued*)

Table 1. (*Continued*).

Social capital constructs, and survey items	Type of measure, internal reliability	Mean score
(4) A band, orchestra, or choir (5) A sports team (6) Another club or organization		
Civic Leadership Check all that apply to you: (1 = yes, 0 = no) (1) I am on student council or student government (2) I am on a planning team for a school organization (3) I am a class officer (4) I am an officer of a club (5) I am a team captain of a sports team	Dichotomous scale, no reliability test because items discrete	0.08

We administered pre/post program surveys to youth aged 14–18 years participating in urban EE (intervention) and in urban non-environmental youth employment programs (non-EE intervention) of the same length in summer 2010. Collecting pre/post program scores of these two groups in a quasi-experimental research design (youth self-selected to different groups) enabled us to compare differences in EE programs versus non-EE programs, thus assessing whether any outcomes we measured were specific to the EE programs rather than related to youth programs more generally (cf. Campbell, Stanley, and Gage 1963; Shadish and Cook 2002). Intervention and non-EE intervention students participated in 5–6 week summer youth programs, about 24 h per week. Intervention students took part in environmental stewardship, recreation, environmental monitoring, and environmental trainings and workshops; most activities were outdoors and emphasized teamwork. Students in the non-EE intervention group conducted office work and mentored younger students, and took part in other largely indoor activities including mixed media, arts, dance, and sports. Females outnumbered males in both intervention (57%) and non-EE intervention groups (54%). In the intervention group, 63 students completed both pre/post surveys (80% return rate), 24 non-EE intervention group students completed surveys (60% return rate) (See Kudryavtsev, Krasny, and Stedman 2012, for more details about Bronx survey implementation).

Assessing validity and reliability

Validity was addressed through content validity, face validity, and member check, and reliability was assessed through internal consistency.

Content validity

Content validity refers to how well the survey questions reflect the theoretical idea of the social capital constructs and social capital more broadly. We adopted one definition of social capital and adapted measures used to quantify social capital developed specifically for this particular definition. The questions were adapted for a

younger audience, with attention to maintaining the original meanings of the constructs.

Face validity

Face validity refers to 'the extent to which the measure is subjectively viewed by knowledgeable individuals as covering the concept' (Sirkin 2005). The survey was reviewed by an outside expert and by a co-author familiar with research in social capital and youth development.

Member check

A member check involves soliciting direct feedback from people who are being studied about the data collected. We pre-tested the instrument with a group of nine youth, aged 14–18 years, and made changes in the survey questions based on the pre-test. Although, ideally, we would have pre-tested the survey with youth 10–14 years as in the Zoomerang survey, given other means of testing for validity, we feel confident that the instrument and the general constructs therein were understandable and relevant to the youth who participated in the Zoomerang study.

Internal consistency

This measure of reliability for one-dimensional constructs was assessed using Cronbach's alphas for the Likert scales for social trust and informal socializing, and Kuder-Richardson's coefficient for the dichotomous scale for diversity of friendship. These tests analyze whether or not several items in one construct all cohesively measure that construct. For the other two dichotomous scales, associational involvement and civic leadership, there was no appropriate measure for reliability as each item reflects separate activities, and we lack strong theoretical justification for how they fit together into a cohesive scale. The results for these analyses are presented below, following which we briefly report on the results of the small implementation of the survey with youth in the Bronx summer enrichment programs.

Results

Measuring reliability

The National Social Capital Benchmark Survey upon which our instrument was based includes algorithms that enable the user to calculate a single number for overall social capital encompassing all 11 constructs. Because, we chose a subset of constructs from the original survey, we were not able to use the algorithms to build a composite number that would enable comparison of levels of social capital to measures used in other studies. Instead, values for each of the constructs are reported individually (Table 1).

Results for the two constructs measured by Likert scales in the Zoomerang survey had Cronbach's alpha levels of 0.64 for social trust and 0.74 for informal socializing. These results establish reliability of these scales, although for social trust reliability was on the low usable level (DeVellis 2003; Peterson 1994). For the items related to diversity of friendships, the Kuder-Richardson coefficient of

0.71 was sufficiently reliable. For the two questions with dichotomous scales, associational involvement and civic leadership, there is no appropriate measure of reliability.

Pilot test of EE program outcomes

The results of the pre/post, EE intervention/non-EE intervention survey implementation with a group of youth in programs in the Bronx suggested that participation in EE programs was associated with statistically significant increases in students' informal socializing (mean score changed from 3.07 to 3.21, $n = 62$) ($t(61) = 2.13$, $p = 0.04$), and students' diversity of friendship (mean score changed from 4.08 to 4.28), $n = 61$ ($t(60) = 2.90$, $p = 0.01$), but not in social trust. At the same time, no significant change was found in any of these constructs in the non-EE intervention group that participated in summer enrichment programs lacking an environmental focus (non-EE intervention, $n = 24$), suggesting that the EE programs had positive outcomes related to two domains of youth social capital. The mean score for associational involvement in EE programs did not change (0.79 pre and post), and civic leadership increased slightly (from 0.21 to 0.26, while the majority of students were involved in zero civic leadership activities); no statistical tests were applied for these items.

Discussion

We consider our literature review of social capital and development of the youth social capital survey instrument as a first step in expanding thinking about potential impacts and practical theories of change in EE, to incorporate community-level outcomes and collective action in addition to individualistic behaviors (cf. Castiglione, van Deth, and Wolleb 2008b). The five attributes included in our survey encompassed both cognitive (e.g. attitudes) and structural (e.g. networks and institutions) components of social capital (van Deth 2008). A national study of youth social capital in the UK also incorporated both cognitive and structural attributes, including reciprocity and trust, views of the local area, social and civic participation, and social networks and support (Whiting and Harper 2003). Linking cognitive and structural, and related individual and community-level constructs, is what distinguishes social capital from other measures of EE outcomes.

Whereas our survey had a number of strengths, including its incorporation of cognitive and structural measures of social capital, we also acknowledge its weaknesses. First, although the reliability for informal socializing and diversity of friendship was sufficient to use the measures, the reliability of the social trust score was relatively low. Further, measurement of youth social trust must be given careful consideration given that youth from low income communities generally have high levels of mistrust of adults and others (Morrow 2002; Whiting and Harper 2003). Thus, whereas a generalized measure for social trust such as used in this study may be appropriate for a regional survey, a more relevant measure for an EE intervention might include items related to trust of those with whom program participants came into contact with through their EE programs. Such a specific measure also may be more meaningful in considering whether or not an EE program has the potential to foster collective action among participants. Similarly, although we might predict a

relationship between EE and associational involvement (e.g. in programs where youth help community organizations plant community gardens or a watershed association measure water quality) and civic leadership (e.g. programs where youth advocate for change with local government), the actual items we used to measure these two attributes, while appropriate for a regional survey, would not be expected to change as the result of an EE program. In addition, our measure only addressed social capital at the individual level. To further the exploration of social capital and EE, a number of steps would need to be taken: (1) identify social capital definitions relevant for various EE practices and research agendas; (2) expand our initial work on conceptual models for the relationship of social capital to EE (Figure 1); (3) develop measures of attributes specific to EE (e.g. measures for associational involvement and civic leadership might include items such as participation and taking leadership in community-based restoration, community gardening associations, citizen science, and environmental advocacy); (4) determine which attributes of social capital (e.g. diversity of friendships and trust) are associated with desired outcomes (e.g. collective action and changes in individual behaviors); (5) expand the suite of tools used for measuring social capital (e.g. participatory tools such as photo-elicitation, quasi-field experiments, and activities based on game theory, cf. van Deth 2008); and (6) continue to address issues related to level of analysis and community, including defining the community of interest and moving beyond individual to community-level measures.

Given the potential positive outcomes of individual- and community-level social capital for youth, their communities, and by way of collective action for the environment, determining what types of organizations, activities, and programs most effectively generate social capital is critical (Bettertogether 2000; Putnam 1995; Sander and Lowney 2006). Several characteristics of EE programs suggest that they are well-suited to fostering social capital among youth and broader communities. For example, some EE programs bring together youth and non-family adults in relationships that are supportive and engage youth in civic action, including local policy discussions and stewardship of neighborhood open space (Ballantyne, Connell, and Fien 2006; Krasny and Tidball 2009a; Mordock and Krasny 2001; Schusler et al. 2009). One also can envision scenarios where EE programs that engage youth with the broader community might enhance social capital attributes, such as informal socializing, trust, and associational engagement, beyond the youth program participants to individuals with whom they interact. For example, youth participants in an EE program included in our pilot study serve as boat guides for community members during Community Rowing days (RTB 2012); through conducting intergenerational recreation activities with the broader community, this program could foster social capital attributes, such as informal socializing and social trust, among youth and the community members with whom they interact. Additionally, one might investigate whether social capital attributes developed within a particular program persist among youth participants beyond their participation in an EE program. For example, would youth engagement in volunteer civil society or faith-based organizations as part of EE programs extend into adulthood?

The notion of social capital has been criticized for combining multiple constructs and levels of analysis, and in fact, our preliminary study indicates that an intervention may have variable outcomes for different constructs. Similarly, other studies have demonstrated that various social capital constructs differ in their predictive power related to desired stewardship and youth outcomes (Furstenberg and Hughes

1995; Miller and Buys 2008). Despite these and other critiques, scholars maintain that integrating cognitive and structural constructs in one measure is useful in enabling understanding of both micro and macro drivers of individual and collective behaviors (Castiglione 2008; Harper 2001; van Deth 2008). For this reason, we support Miller and Buys' (2008, 1) claim that 'building specific aspects of social capital might be an effective EE and engagement strategy, one that could work at the local level to promote feelings of environmental responsibility and, potentially, foster environmentally sustainable attitudes and behavior change.' Further, consideration of social capital not only is consistent with participatory, emancipatory, place-based, and other approaches to EE, but also can help expand EE theory and practice to encompass research on factors that facilitate collective action. Finally, social capital is considered an attribute of resilient social-ecological systems (Walker and Salt 2006), i.e. systems that are able to adapt and transform in the face of ongoing change and larger disturbances (Folke et al. 2002); an increasing body of literature focuses on the potential role EE might play in fostering such resilience and adaptive capacity in light of disasters and accelerating global change (Krasny, Lundholm, and Plummer 2011). Integrated social-ecological systems and resilience are foundational concepts in the EE-related disciplines of natural resource management and sustainability (Dietz, Ostrom, and Stern 2003; Liu et al. 2007; Reid, Jensen, and Nikel 2008), and may be viewed as an ultimate outcome of EE that fosters social capital in the contexts of youth and community well-being and collective action (Figure 1).

Conclusion

If one goal of EE is collective action to steward the environment, then we might return to how the rural school superintendent described in Hanifan's early work went about creating formal and less formal opportunities for interactions that led to more trusting relationships and social networks, which in turn enabled the community to advocate for local improvements. In short, recreational, social, and stewardship activities incorporated into EE may create elements of social capital that enable collective action around stewarding a common pool environmental resource. However, measures of social capital need to be further developed that consider factors specific to youth and intergenerational EE programs (e.g. general lack of trust among youth), and that are relevant to youth and community development and collective stewardship action outcomes.

Several scholars have suggested that bringing together individuals holding diverse perspectives enables the emergence of novel ideas and solutions to problems (Biggs, Westley, and Carpenter 2010; Krasny and Dillon, 2014; Moore and Westley 2011; Young 2008). Perhaps, because social capital integrates so many different perspectives, it favors 'exchanges, collaboration, and debates across disciplines in ways that are often unusual' (Castiglione, van Deth, and Wolleb 2008b, 6). We hope our initial attempts to develop a measure of youth social capital, and our literature review and proposed conceptual model of social capital in the context of youth development, collective action related to natural resource management, and social-ecological systems resilience more broadly (Figure 1), will open up discussions that lead to innovation and adaptation in EE as we face increasingly more complex environmental and social dilemmas.

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