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Transformational practices in cohousing: Enhancing residents' connection to community and nature

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ABSTRACT

Connection to others predicts pro-social behavior and personal well-being. Connection to nature predicts pro-environmental behavior and personal well-being. Cohousing is a residential development intended to enhance residents' connection to others and nature, but systematic study of the *transformational practices* adopted to promote connection has been lacking. Data from a national survey of cohousers in the US ($N = 559$) were used to create a typology of cohousing practices; measures of connection to community and nature were regressed on self-reported frequency of participation in the resultant categories of practices. Stewardship of the natural environment and fellowship and culture practices predicted greater connection to nature. Cohousing core, sharing and support, and fellowship and culture practices predicted greater connection to community. The concepts of connection to nature, connection to community, and transformational practices warrant further development in terms of theory and measurement.

1. Introduction

> "No matter how much one may love the world as a whole, one can live fully in it only by living responsibly in some small part of it. Where we live and who we live there with define the terms of our relationship to the world and to humanity." (Berry, 1996, p. 123)

Cohousing is the fastest growing type of intentional community in the US. Husband and wife architects McCamant and Durrett (1994) brought the concept to the US in the 1980s from Denmark, where it emerged in the 1960s and is now used extensively as a government-endorsed housing model. McCamant and Durrett (1994) characterize cohousing by six features: (1) a participatory development process, (2) neighborhood design, (3) resident management, (4) common facilities, (5) non-hierarchical structure and decision-making, and (6) no shared economy. George (2006) suggests that four characteristics distinguish cohousing from other types of communal living: (1) neighborhood design that features a central meeting place (courtyard, pedestrian street, or internal atrium), (2) a deliberate size that balances capacity for intimacy and stability (between 20 and 30 units in the US), (3) absence of hierarchy, and (4) separate incomes.

Cohousing communities are typically compact developments with modest homes. A common house is standard and provides cooking and dining facilities for one or more shared meals per week, a quintessential cohousing practice. The common house often includes a guest room, shared laundry, children's rooms, space for community meetings, and occasionally office space and an exercise room. Chicken coops, sheds, and hot tubs are also common. Shared land typically includes community gardens, open space, and shared parking on the periphery of the neighborhood—connected by shared pathways.

The chief goal of cohousing, historically, is to create a rich social environment with enhanced mutual support. Members share tools, such as lawnmowers and laundry facilities, and enjoy many other practical benefits (e.g., "someone to feed your cat while you're out of town, a neighbor who will baby-sit on short notice, a backyard play structure for the kids, and grounds that are more than most individuals could maintain on their own"; Smith, 2002, p. 3). These practices of sharing also have environmental implications and cohousing in the US has become increasingly more explicitly oriented toward environmental responsibility (Durrett & McCamant, 2011). Research confirms its success in this regard (Kirby, 2003; Margolis & Entin, 2011; Meltzer, 2005; Torres-Antonini, 2001; Williams, 2005a). The size and cooperative culture of cohousing is conducive to sustainable practices such as obtaining renewable energy, small-scale agriculture and animal husbandry, composting, and recycling.

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According to the directory managed by the Fellowship for Intentional Community (FIC), there are approximately 134 established cohousing communities in the US and 176 in the formative stage (FIC, 2010). Most are on the west and east coasts, they can be urban, suburban, or rural, and they tend to be located near large cities or in university towns (Margolis & Entin, 2011). Most are multigenerational (there are four senior cohousing communities in the US), new build construction (about 20 are adaptive reuse or retrofit developments), and developed through a resident-led process (a small minority are created through resident-developer partnerships and even fewer are developer-driven).

1.1. Transformation through connection

The critical context of the contemporary cohousing movement includes long-standing criticisms of American suburbia and the single-family detached "dream home". Suburban "sprawl" has been blamed for contributing to the breakdown of social institutions (Putnam, 2000), environmental degradation (Johnson, 2001), and lack of physical activity and obesity (Frumkin, Franck, & Jackson, 2004). The suburban detached single-family dwelling has been criticized for being unsupportive of current demographics of household composition (Franck & Ahrentzen, 1989) and reinforcing stereotyped gender roles (Hayden, 1982, 2002). Although there are many exceptions to this characterization of suburbia, there is general agreement that isolating development patterns became ubiquitous in the US after World War II.

The cohousing movement, like the New Towns movement of the 60s and 70s (Forsythe, 2005) and the more contemporary New Urbanism movement (Congress for the New Urbanism, 1999; Katz, 1993), is a reaction against this pattern, seeking to counter alienation by adopting design strategies at various scales that promote community identity and interaction and provide access to nature. Cohousing differs from these other similarly motivated movements in that it is grassroots, smaller in scale, and imposes alternative social structures in addition to physical design strategies. There is a pervading theme in research on cohousing and ecovillages (a related type of intentional community that focuses more explicitly on sustainability) that more socially and environmentally sustainable lifestyles are supported in these communities due to an enhanced sense of connection among residents, nature, and community, or a greater understanding of the interdependence of self, society, and environment:

> What does a sustainable society look and think like? — ecovillages suggest the necessity of a paradigm that facilitates a sense of community wider than the traditionally human one. It means that not only do people have a more accurate understanding of the complex interrelations between themselves and the land, but also that they feel obligated to steward the land that gives them so much. (Kasper, 2008, p. 24)

In his study of Ecovillage at Ithaca (EVI), an ecovillage consisting of four cohousing neighborhoods, Kirby (2003) outlined a more differentiated taxonomy of connections that promote a sustainable lifestyle: (1) connection with the wild landscape; (2) connection with community; (3) connection with a cultivated landscape of benign human activity; (4) a sense of personal integration; and (5) connection through time, or intergenerational sustainability. He concluded:

> Through the adoption of practices at [Ecovillage at Ithaca] that make explicit the connectedness of the individual to the social and ecological worlds both self and environment are being mutually and reciprocally transformed. The development of a new form of social and ecological relations takes place through the everyday lived experience of residents. (Kirby, 2003, p. 332)

Two important points are conveyed in this quote. First, behavioral mechanisms (i.e., "practices" and "lived experiences") are important antecedents to enhanced connectedness and transformation. Secondly, transformation through connection is a cyclic process. Critical, or transformational, cohousing practices enhance residents' sense of connectedness, which in turn leads to "a new form of social and ecological relations"—supposedly more sustainable relations, which may be manifested in those same practices, other practices, or more enduring personal, social, and environmental outcomes (e.g., health, well-being, social capital, resource conservation). The initial adoption of transformational practices—indeed, the initial decision to live in cohousing, likely depends on existing levels of, or proclivities for, connectedness, but residents' participation in transformational practices further enhances connectedness and leads to more sustainable relations between residents, the community, and the environment.

The theory of transformation through connection in cohousing, most clearly developed by Kirby (2003), is supported by two overlapping literatures from the fields of social and environmental psychology: self-other overlap (i.e., oneness, or connection to other; for current purposes: connection to community) and connection to nature, respectively. The following review considers the concepts of connection to nature and connection to community and their established relationships to personal well-being and pro-social and pro-environmental behavior. Special attention is given to how these connections may be enhanced by cohousing practices.

1.1.1. Connection to community

Social psychologists have identified a core aspect of interpersonal closeness that leads to more pro-social behavior: the inclusion of others in one's sense of self. In close relationships, individuals are more likely to engage in perspective-taking, which is attended by empathic concern and leads to self-other overlap, wherein the individual may perceive the self as including resources, perspectives, and characteristics of the other (Aron & Aron, 1986; Aron, Aron, Tudor, & Nelson, 1991; Cialdini, Brown, Lewis, Luce, & Neuberg, 1997). "Consequently, what one does to and for these others one does to and for oneself." (Cialdini et al., 1997, p. 492).

This sense of connectedness or interdependence is not only important in promoting pro-social behavior, but also has implications for personal well-being. Baumeister and Leary (1995) describe belongingness as a fundamental motivation and a strong, basic need for "regular social contact with those to whom one feels connected" (p. 501), "in a stable and enduring framework of affective concern for each other's welfare" (p. 498), with immense implications for physical and mental health, general well-being, and happiness. On the other hand, a lack of belongingness, or social isolation, has detrimental effects.

The inclusion of other in the self, also referred to as the self-expansion model (Aron & Aron, 1986), has been extended to conceptualize one's connectedness to a whole community: the inclusion of community in self (Mashek, Cannaday, & Tangney, 2007; Mashek, Stuewig, Furukawa, & Tangney, 2006). A comment by Wendell Berry (1987) is illustrative of this type of connection to one's local community: "Most important, it must be generally loved and competently cared for by its people, who, individually, identify their own interest with the interest of their neighbors" (p. 103). Similar to the inclusion of another individual in the self, the inclusion of community in the self results from close relationships with community members, perspective-taking, and self-other overlap. Therefore, enhanced connection to one's cohousing

community likely results from practices that promote close relationships, regular social contact, and perspective-taking among neighbors.

The concepts of belongingness, identity, interdependence, and self-other overlap are evident in Kirby's (2003) observation that connection to community at Ecovillage at Ithaca "leads to a sense of belonging, and cooperative communion in realizing a common goal" (Kirby, 2003, p, 331). Practices that may enhance connection to community among cohousing members begin with the resident-led formation of the group and collaborative community visioning, design, and development process, and continue throughout the life of the community as they collectively own, manage, and enjoy communal facilities, spaces, and amenities. Cohousing communities usually govern by consensus, meeting once or twice monthly or bimonthly as a group, often in addition to smaller, specialized committee meetings and activities. Consensus decision-making requires a great deal of perspective-taking, which likely results in some self-other overlap among members. Consensus also exemplifies collective deliberation—a topic currently receiving much attention among academics and policy-makers. Deliberative theorists call for the democratization of institutions that impact peoples' everyday lives and suggest that deliberation results in the discursive reconstruction of selves that are more public-spirited, tolerant, knowledgeable, and insightful about one's own and others' interests (Warren, 1992), parts of which sounds remarkably similar to the self-expansion model.

The built environment of cohousing also promotes social interaction (Williams, 2005b), from common spaces that provide convenient locales for communal practices (e.g., meals, meetings, parties) to other design features like houses that face each other, parking on the periphery, shared paths to activity sites, and modest private dwellings—sometimes with fewer facilities (e.g., no private laundry). McCamant and Durrett (1994) coined the term social contact design (SCD) to describe such features. Kirby's (2003) definition of connection to community at Ecovillage at Ithaca incorporates a sense of connection to the physical settlement; practices that promote this aspect of connection might be those that imbue sentimental or symbolic meaning to the locales in which they occur (Firey, 1945; Gans, 1962/1982).

1.1.2. Connection to nature

The self-expansion model (Aron & Aron, 1986) has also been extended to one's relationship to nature (Davis, Green, & Reed, 2009; Davis, Le, & Coy, 2011; Schultz, 2001). Similar to the inclusion of other(s) in self, the inclusion of nature in self (or connection to nature) is conceptualized in both affective and cognitive terms, as an individuals' sense of oneness with the natural world and including the degree to which one perceives the qualities and welfare of the natural environment as related to their own personal well-being. Mayer and Frantz (2004) demonstrated that connection to nature is an important predictor of subjective well-being and ecological behavior.

Similar to connection to community, connection to nature is enhanced when one interacts with nature (e.g., natural settings, objects, plants, and animals) in the context of a close relationship—sensing or technically understanding one's interdependence with the natural world. In the context of cohousing, connection to nature may be enhanced via practices whereby residents are exposed to or take an active role in relation to natural resources and processes by which their needs are met, such as growing food and building shelters with local materials.

Kirby (2003) describes two kinds of connection to nature at Ecovillage at Ithaca: connection with the wild landscape and connection with a cultivated landscape of benign human activity. He proposed that the latter creates "a sense of partnership with the living landscape of natural and benign human activity, and connects the landscape and the community together" (p. 331) and is forged through activities of "respectful stewardship and cultivation of the land" (p. 331). The scale and cooperative structure of cohousing are conducive to such activities, including recycling, installing solar or geothermal energy systems and greywater systems, and supporting local food systems (gardening, involvement in CSAs, raising livestock, composting).

1.2. Present study

Important relationships between connection to nature and community and personal well-being, pro-social behavior, and pro-environmental behavior have been established. It has also been established that cohousing promotes pro-social and pro-environmental behavior among those electing to live in such an arrangement. The contributions of this research include a typology of cohousing practices and the identification of types of cohousing practices that predict enhanced connection to nature or community (termed *transformational practices*), thus building on the theory of transformation through connection in the context of intentional community.

Based on the literature review and conceptual framework, transformational practices lead to enhanced connection to nature and community, which in turn should lead to greater personal well-being and pro-social and pro-environmental behavior. In some cases, transformational practices may also be directly related to these outcomes (e.g., participation in common meals may directly predict a healthier weight, financial savings among residents, and pro-social behavior between residents), but these relationships are not examined in the present study.

The present research utilizes cross-sectional survey data from a large sample of US cohousing residents, or "cohousers". This study is correlational and therefore cannot prove that participation in cohousing practices increases levels of connectedness (or vice versa, since mutual causation is likely). As previously noted, residents adopt practices doubtless to some extent due to their pre-existing levels of or proclivities for connectedness, but the practices can in turn be the impetus of increased connectedness. The analyses take into account duration of residence in cohousing to mitigate the problem of mutual causation (connectedness should be positively associated with length of residence if cohousing practices are transformational); however, mutual, or reverse, causation is also a threat here as residents with greater connectedness may remain in cohousing longer. Regardless of the directionality of the relationships, types of transformational practices, identified by their positive associations with connectedness, are crucial building blocks of a cohousing community that can succeed in its goals related to social and environmental sustainability.

2. Method

2.1. National survey of cohousers

The Cohousing Association of the United States (CohoUS) began a three-phase research project in 2010 to promote the value of cohousing and inform existing and forming cohousing communities. Phase 3 of this effort was an online survey of cohousers; data were collected in June and July of 2012. The present author directed the survey on behalf of CohoUS; independent researchers in various disciplines with different research questions contributed survey items. The present analysis concerns relationships between residents' individual participation in cohousing practices, sense of connection with community and nature, and duration of residence in cohousing.

2.1.1. Community inclusion criteria

US cohousing communities were identified from several sources, including the cohousing directory maintained by FIC (2010) and used by CohoUS, archival survey data from 89 communities (Margolis & Entin, 2011), and personal communication with cohousing experts (Morris & Cohen, 2011). Senior cohousing and developer-driven cohousing were excluded (four of each were identified); the latter refers to developments planned without substantial input from at least a core group of residents—lacking what McCamant and Durrett (1994) call *participatory process*.

2.1.2. Participants, recruitment, and procedure

The author and research team compiled a database of all unit addresses in US cohousing communities using a variety of publicly available sources, including County Assessor's Office websites, GIS departments, personal communication, and 411.com. Researchers drew a simple random sample of 1000 households in traditional new build and reuse development (of previously commercial or industrial land use) cohousing communities from the comprehensive address database; instructions requested participation from only one adult from each selected household; no within-household selection method was employed. Residents of retrofit cohousing (adaptation of pre-existing housing stock) were oversampled (for purposes of another study: Sanguinetti, in press); all adult residents were solicited (estimated to be about 275).

Participants were recruited via USPS mailings and emails. Mailings included an invitation letter and a reminder postcard. In conjunction with paper mailings, emails were sent to contacts in each community with a request to forward an email invitation letter and subsequent reminder (same message as paper mailings) to members of the selected households within their respective communities. The materials alerted prospective participants that they may be receiving both paper and email invitations and that they should only participate once. Survey responses were anonymous, but participants had an option to enter a raffle if they contacted the lead researcher and provided contact information.

The survey was initiated by 562 persons, of which 477 completed it (an 85% completion rate). Respondents represented 127 cohousing communities (Frog and Song Cohousing, both part of Ecovillage at Ithaca, were considered part of the same community in this study). Based on average sample sizes for the survey items used in the following analyses and household composition measures, the response rate of the random sample of traditional (new build and reuse) cohousing residents (*Mean of* $N = 436$) was 44% and the sample represents about 10% of the adult population in traditional cohousing (estimated at 4258). The response rate of the inclusive sample of retrofit cohousers (*Mean of* $N = 43$) was about 16% and provided proportional representation of this subgroup (i.e., retrofit cohousers composed 9% of our sample and 6% of the population of all cohousers).

Sixty percent of the respondents were female ($N = 468$). Of the 470 who reported their age, 41% were 60 or older, 24% were 50–59, 21% were 40–49, 12% were 30–39, and 2% were 20–29. About 66% of respondents had a graduate degree, 28% had a Bachelor's, 2% had an Associate's degree, and 4% had some college but no degree (no respondents reported only high school or less). Respondents averaged around eight years of living in cohousing, which is a slight underestimate since the highest response option was 20 or more years (the other options were each number 1 through 19).

2.1.3. Instrument

The survey instrument included questions from major national surveys (e.g., American Communities Survey and American National Election Survey), psychological measures and scales, and some novel questions designed to collect information specifically relevant to cohousing residents. Items relevant to this analysis measured connection to community, connection to nature, participation in cohousing practices, and duration of residence in cohousing (in years). Pilot testing indicated that the survey took approximately 30 min to complete.

2.1.4. Measuring participation in cohousing practices

Respondents recorded the frequency of their participation (never, less than once/month, about once/month, about once/week, more than once/week) in 26 practices that are typical of cohousing communities. This list of practices was created based on review of previous research, studying cohousing community websites, and consulting with cohousing residents who were co-researchers. Principal component analysis, supplemented by theory, was used to create a typology of practices. The resultant categories served as independent variables in regression analyses to predict the following measures of connectedness.

2.1.5. Measuring connection to nature

The present study employed the Inclusion of Nature in the Self (INS) Scale (Schultz, 2001) to measure connection to nature. The INS Scale is a modified version of the Inclusion of Other in the Self (IOS) Scale (Aron, Aron, & Smollan, 1992). The INS is a single-item, pictorial measure, consisting of a series of Venn diagrams, each with two same-sized circles that increase in degree of overlap. The INS consists of seven pairs of circles (see Fig. 1). Diagram choices were converted to numbers (1 = least overlap, 7 = greatest overlap); higher scores represented greater inclusion of nature in the self ($N = 485$, $M = 4.94$, $SD = 1.37$).

Connection to nature was also measured with an abridged version of the Connection to Nature Scale (CNS; Mayer & Frantz, 2004). The CNS consists of 14 items with high inter-item reliability; it was abridged to 5 Likert items; see Table 1. Items 4 and 5 were reverse-scored. Item 5 was removed due to low inter-item correlations. The resultant 4-item scale yielded an alpha of .75.

2.1.6. Measuring connection to community

Connection to community was measured using the Inclusion of Community in the Self (ICS) Scale (Mashek et al., 2007), another modification of the Inclusion of Other in the Self (IOS) Scale (Aron et al., 1992); see Fig. 2. Respondents were instructed to choose the pair that best represents their sense of connection to the community. Diagram choices were converted to numbers (1 = least overlap, 6 = greatest overlap); higher scores represented greater inclusion of community in the self ($N = 481$, $M = 3.93$, $SD = .97$).

The ICS Scale was modified for the present study by specifying one's cohousing community as the community represented in the diagrams; the scale has been modified similarly to study inmates' sense of connection to the criminal community (Mashek et al., 2007; Mashek et al., 2006) and identification with various in-groups (Tropp & Wright, 2001). Tropp and Wright (2001) concluded that the degree to which an in-group is included in the self, via this measure, underlies interdependent self-construals, collective identity, and collective self-esteem. Mashek et al. (2007) assert that the measure "captures the essence of community connectedness" (p. 271); they demonstrated test-retest reliability, convergent validity, and discriminant validity of ICS and found it to correlate with self-reports of community helping and hurting.

The ICS does not specify connection to both the social and physical aspects of a community, but it was created with social relationships as the focus. Thus, it may not adequately capture connection to the physical aspects of a cohousing community. The INS and CNS may capture some of this connection to the physical, especially natural, elements of a cohousing community, but it implies a more global concept of nature (Mayer & Frantz, 2004);

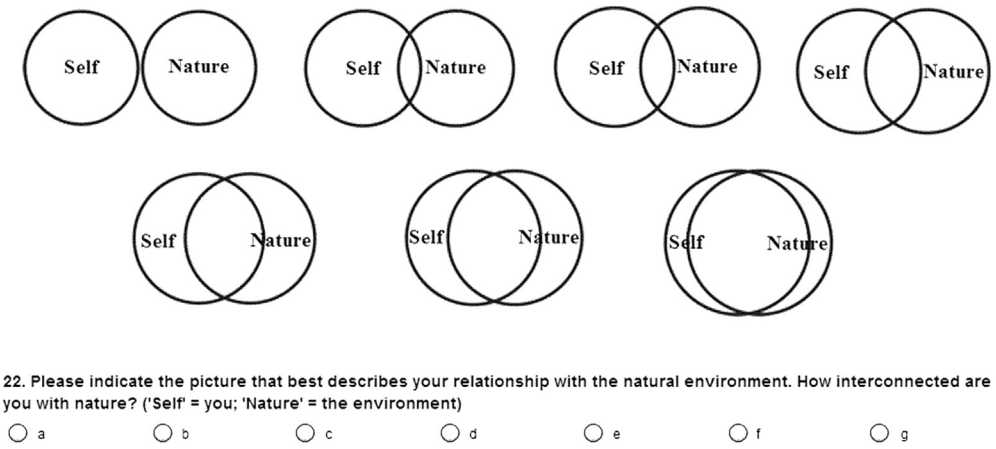

Fig. 1. Inclusion of nature in self (INS) scale.

connection to nature within the local community is not the construct in focus.

Eight 5-point Likert items were included to assess community place attachment, a concept that incoporates connectedness to the physical community, including natural and built aspects; see Table 2. Place attachment involves identity overlap and affective bonds (Bonaiuto, Aiello, Perugini, Bonnes, & Ercolani, 1999), which are elements of the self-expansion theory (Aron & Aron, 1986). Two items were intended to assess physical place attachment in particular: (1) The physical appearance of my community fits well with who I am as an individual (Ruggeri, 2009), and (2) I would be sorry to move, even if the people I appreciate in my community moved with me (Hidalgo & Hernandez, 2001). These two items were significantly correlated ($r = .38$, $p < .001$), but did not have a high enough alpha ($\alpha = .55$) to justify their use as a separate scale. All eight place attachment items were used in a single composite measure of socio-physical Community Place Attachment (CPA; $\alpha = .88$) that explicitly encompasses physical place attachment.

3. Results

3.1. Relationships between connectedness measures

The two connection to nature scales (INS and CNS-abridged) were strongly correlated; $r = .61$, $p < .001$. Likewise, the two connection to community scales (ICS and CPA) were strongly correlated; $r = .55$, $p < .001$. Additionally, CPA was correlated with CNS-abridged; $r = .13$, $p < .01$ and ICS was correlated with INS; $r = .09$, $p = .04$. CPA and CNS were not significantly correlated; $r = .06$, $p = .19$.

Table 1
CNS-abridged item correlations, medians, and standard deviations.

	1	2	3	4	5	Median	SD
I often feel a sense of oneness with the natural world around me.	1					Mildly agree	.86
I think of the natural world as a community to which I belong.	.57	1				Strongly agree	.77
I recognize and appreciate the intelligence of other living organisms.	.53	.59	1			Strongly agree	.78
I often feel disconnected from nature.[a]	.45	.32	.26	1		Mildly disagree	1.06
My personal welfare is independent of the welfare of the natural world.[a]	.02	.10	.06	−.01	1	Strongly disagree	1.58

[a] Reverse-scored.

3.2. Cohousing practices

Principal component analysis with varimax rotation yielded eight factors with eigenvalues greater than one; see Table 3. Seven categories of practices were created based on these eight factors with minor alterations based on theory.

There was little theoretical soundness to the eighth factor, which included only smaller dinner groups and babysitting, childcare exchange or cooperative, since the goal is a typology composed of categories of like practices. These two practices may correlate because young families may be more likely to be involved in both; in other words the similarity lies in the actors rather than the activities. Smaller dinner groups was included in the category nominated 'fellowship' (Factor 3) and babysitting, childcare exchange or cooperative was included in 'sharing' (Factor 1). Community work days factored with other activities in the 'stewardship of the natural environment' category, but was placed instead within the 'cohousing core' category.

The seven resultant activity categories are referred to as cohousing core, sharing, support, fellowship, culture, stewardship—natural environment, and stewardship—built environment. Cohousing core refers to activities which are almost definitional to cohousing (i.e., managing and maintaining the community together and eating together), including: community meals; smaller dinner groups; community meetings; smaller management team meetings; and community work days. Sharing consists of activities generally involving reciprocal sharing of resources: carpooling; materials exchange, gifting, or sharing (tools, clothes, housewares, vehicles, etc.); exchange or donation of services (home/car/bike repair, computer support, pet/plant care, etc.); skill sharing; babysitting, childcare exchange or cooperative. Support, on the other hand, refers to reallocation of resources where there is a clearer demarcation of giver and receiver: care and support of elderly neighbors, care and support of sick or injured neighbors, support of new parents, and voluntary financial aid.

Fellowship includes interest-based common activities: physical, spiritual, or mental wellness groups; movie or game nights, talent shows; literature, arts, or crafts clubs; smaller dinner groups; and other special interest groups. Culture consists of traditional or entertainment-based activities: live music, other art shows/performances; parties, holiday celebrations; other community traditions; and events that benefit the larger community (fundraising, educational, entertainment, political, electoral). Stewardship of the natural environment refers to activities that involve caring for or attending to the natural environment: (community work days),

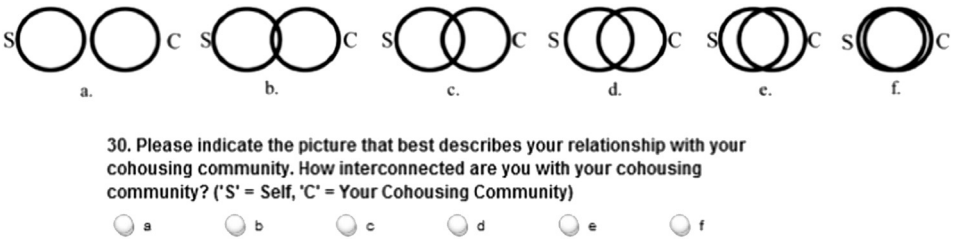

Fig. 2. Inclusion of community in the self (ICS) scale.

routine grounds maintenance; landscaping projects; and gardening, farming, or animal husbandry. Stewardship of the built environment refers to activities that involve caring for or attending to the built environment: routine building maintenance and construction projects.

Cohousing core practices yielded a lower alpha than the other categories ($\alpha = .57$), but was retained as a category for regression analyses because of its theoretical value. Sharing and support were collapsed into one category for regression analyses since they are theoretically similar (both involve resource-sharing) and highly correlated ($\alpha = .79$). Likewise, fellowship and culture were collapsed—both consist of social activities without obvious practical functions ($\alpha = .72$). Stewardship of the built environment ($\alpha = .64$) and stewardship of the natural environment ($\alpha = .73$) categories were correlated and theoretically related but retained as separate predictors since stewardship of the natural environment is theoretically more related to connection to nature.

3.3. Transformational cohousing practices

Each category of cohousing practices except stewardship of the built environment was significantly correlated with at least two connectedness measures; see Table 4. Sharing and support, fellowship and culture, and stewardship of the natural environment positively correlated with at least one measure of connection to nature. Cohousing core, sharing and support, and fellowship and culture positively correlated with at least one measure of connection to community.

Hierarchical multiple regression analyses were conducted for each of the four connectedness measures. The basic demographic variables, sex, age, and education, were entered in the first model, along with duration of residence in cohousing in the second model. Cohousing practices were added in the third and final model; see Tables 5–8.

Initially, demographic variables significantly predicted INS, CNS, and ICS, but not CPA. Females reported greater connection to nature and community (via ICS), age was positively related to connection to nature and community (via ICS), and education was negatively related to connection to nature. All three demographic predictors of connection to nature via INS remained significant after the addition of other variables, but only age remained a significant predictor of CNS after the addition of cohousing practices. Sex and age failed to predict connection to community via ICS after the addition of cohousing practices, suggesting that participation in cohousing practices mediates the effects of sex and age on connection to community. There was a significant positive correlation between age and participation in cohousing core ($r = .19$, $p < .001$) and fellowship and culture practices ($r = .12$, $p < .01$), a significant negative correlation between being male and participation in fellowship and culture practices ($r = -.12$, $p = .01$), and a significant positive correlation between being male and participation in stewardship of the built environment practices.

Duration of residence significantly predicted connection to community measures, but not connection to nature measures (although it was approaching significance for CNS when first entered; $p < .10$). These relationships remained significant after cohousing practices were added to the models. This suggests that variables other than self-reported participation in cohousing practices, as defined in this study, mediate the effect of duration of residence in cohousing on connection to community.

Stewardship of the natural environment and fellowship and culture (for CNS) significantly predicted greater connection to nature. Cohousing core, sharing and support (for ICS), and fellowship and culture predicted greater connection to community. Stewardship of the built environment predicted less connection to community. Self-reported participation in cohousing practices explained 5–9% of residents' self-reported connection to nature and 17–23% of residents' self-reported connection to community (according to r-squared change values). The full regression models explained 7–15% of the variance in connection to nature and 18–26% of the variance in connection to community (according to adjusted r-squared values).

4. Discussion

Limitations of this study include that it relies on self-reported rather than actual behavior. Respondents may have over- or under-reported their actual participation in various practices.

Table 2
CPA item correlations, medians, and standard deviations.

	1	2	3	4	5	6	7	8	Median	SD
The physical appearance of my community fits well who I am as an individual.	1								Mildly agree	.95
I live in my community, but feel like my roots are elsewhere (adapted from Ruggeri, 2009).[a]	.24	1							Mildly disagree	1.2
My community is home to me (adapted from Ruggeri, 2009).	.34	.59	1						Strongly agree	.93
I feel safe here (Schroder, 2008).	.29	.35	.52	1					Strongly agree	.70
There is a strong community spirit here (Schroder, 2008).	.30	.42	.51	.46	1				Mildly agree	.96
When talking to others about my community I feel proud (adapted from Maor, 2011).	.40	.46	.59	.48	.71	1			Strongly agree	.91
I am attached to my community (adapted from Maor, 2011; Scannell & Gifford, 2010).	.33	.56	.71	.50	.64	.69	1		Strongly agree	.88
I would be sorry to move, even if the people I appreciate in my community moved with me.	.38	.51	.57	.41	.50	.58	.62	1	Mildly agree	1.07

[a] Reverse-scored.

Table 3
Rotated factor loadings of items assessing participation in cohousing practices.

	Component							
	1	2	3	4	5	6	7	8
Carpooling	**.43**	.22	.29	.18	.05	.08	−.22	.30
Exchange or donation of services	**.77**	.07	.06	.20	.18	.09	.15	−.03
Materials exchange, gifting, or sharing	**.78**	.08	.07	.12	.10	.15	.10	.17
Skill sharing or training among neighbors	**.57**	.09	.20	.32	.13	.15	.27	.12
Community work days	−.10	**.45**	−.10	.18	.38	.14	.25	.07
Routine grounds maintenance	.04	**.77**	−.03	.08	.09	.07	.27	.00
Landscaping projects	.07	**.78**	.06	.16	.08	.02	.23	.03
Gardening, farming, or animal husbandry	.17	**.79**	.11	−.01	−.00	.03	−.04	.04
Physical, spiritual, or mental wellness groups	.23	.06	**.71**	.04	.16	−.04	−.06	.12
Movie or game nights, talent shows	−.05	.13	**.46**	.05	.33	.24	−.08	.42
Literature, arts, or crafts clubs	.02	−.01	**.64**	.20	.05	.04	.16	.06
Other special interest groups	.09	.08	**.65**	.28	.11	.20	.04	−.09
Care and support of elderly neighbors	.21	.22	.22	**.65**	.13	.03	−.14	.05
Care and support of sick or injured neighbors	.08	.08	.12	**.75**	.15	.08	.08	.17
Support of new parents	.20	.09	.06	**.56**	.29	.01	.12	.36
Voluntary financial aid/ assistance	.25	−.01	.22	**.61**	−.09	.18	.09	−.06
Community meals	.25	−.01	.10	−.08	**.71**	.06	−.06	.20
Community meetings	.09	.13	.16	.24	**.74**	.10	.10	−.04
Smaller management team meetings	.06	.10	.22	.14	**.60**	.21	.09	−.18
Live music, other art shows/ performances	.04	−.05	.46	.04	.14	**.52**	.10	.20
Parties, holiday celebrations	.14	.06	−.08	−.02	.23	**.74**	−.05	.27
Other community traditions	.14	.11	.15	.19	.09	**.78**	.08	−.03
Events that benefit the larger community	.36	.05	.33	.32	.03	**.47**	−.05	−.20
Routine building maintenance	.09	.21	−.01	.08	.13	.07	**.77**	.06
Construction projects	.20	.30	.15	−.01	−.02	−.04	**.75**	.02
Smaller dinner groups	−.01	−.06	.25	.11	.02	.25	.24	**.56**
Babysitting, childcare exchange or cooperative	.38	.10	−.05	.17	−.09	−.01	−.05	**.63**

Extraction Method: Principal Component Analysis.
Rotation Method: Varimax with Kaiser Normalization.

Further, the regression models offered in this paper leave much to be explained in terms of predicting cohousing residents' sense of connection to community and to nature.

A typology of cohousing practices was empirically derived from survey items using principal component analysis. Supplemented by theory, the resulting categories were cohousing core practices, sharing and support, fellowship and culture, and stewardship of the natural and built environment. Sharing and support, fellowship and culture, and stewardship of the natural environment were significantly associated with connection to nature at the bivariate level. Fellowship and culture and stewardship of the natural environment predicted greater connection to nature; cohousers whose participation in these practices was more frequent reported higher levels of connection to nature.

Stewardship of the natural environment predicted greater connection to nature, which is intuitive and makes sense in terms of the literature on connection to nature. Fellowship and culture as a significant predictor of CNS was a little more surprising. However, many of these practices may occur outdoors (e.g., wellness groups involving outdoor exercise, parties, other community traditions, live music and art shows/performances, and events that benefit the larger community).

Self-reported participation in cohousing core, sharing and support, and fellowship and culture predicted greater connection to community. These practices consist of social interaction among residents that promote close relationships. Frequent interactions in the context of close relationships promotes perspective-taking, which results in enhanced connection to community.

Self-reported participation in stewardship of the built environment practices predicted less connection to community. There were only two practices in this category: routine building maintenance and construction projects. The only significant bivariate correlation with connectedness measures was a positive one between construction projects and INS. One explanation of the non-significant correlations and the negative regression coefficients for this category in the analyses of connection to community is that work-share is one of the biggest challenges and points of contention in cohousing (Margolis & Entin, 2011). Routine building maintenance could encompass less desirable tasks that fall to the persons with the most stringent standards for cleanliness or organization or who feel most obligated for whatever reasons, resulting in some resentment toward the community that could diminish connectedness.

Living in cohousing did not seem to have much effect on connection to nature, perhaps because, as measured in this study, connection to nature is a global concept (i.e., the INS and CNS items refer to "nature", "the natural world" and "living organisms"), affected by many factors outside one's cohousing experiences, rather than reflecting a more local connection to particular nature in one's community (i.e., particular pets, livestock, plants, and other landscape features). As Berry (1993) observed, "No settled family or community has ever called its home place an 'environment' …. The real names of the environment are the names of rivers and river valleys; creeks, ridges, and mountains; towns and cities; lakes, woodlands, lanes, roads, creatures, and people" (p. 35). Furthermore, cohousing practices that enhance connection to nature (e.g., gardening) are relatively feasible in conventional residential settings compared to the more unique kinds of social practices supported in cohousing.

Longer durations of residence in cohousing predicted greater connection to community. Michelson (1969) found that participation in community associations and meetings mediated a positive relationship between length of residence and satisfaction in a variety of housing types. In the present study, length of residence remained a significant predictor of connection to community after participation in cohousing practices was added to the models. This suggests that other mechanisms affecting connection to community in cohousing need to be identified.

Future research should investigate the contributions of less formal practices and covert experiences to residents' connection to community, such as spontaneous conversations on community pathways and porches and psychological responses to community design features. For example, Kirby (2003) noted that connection to community in Ecovillage at Ithaca "is further underscored by the contrast between the compact settlement and the expansiveness of the land amid which the ecovillage sits" (Kirby, 2003, p. 331). Not all cohousing communities are situated amid expansive wild land, but they all have features that may enhance connection to community via symbolic meaning, such as the centrality and prominence of common spaces or a community art project that serves as a landmark.

Likewise, connection to nature may be enhanced in cohousing through informal practices and covert behavioral mechanisms not addressed in the present study, such as sitting in the common garden or playing with pets and farm animals in the community. A group of related architectural theories explain how connection to

Table 4
Correlations between practices and connectedness.

Practice	Median	SD	INS		CNS		ICS		CPA	
Cohousing Core			.02		.08		.42	**	.39	**
Community meals	About once/week	1.13	−.03		−.02		.37	**	.40	**
Community meetings	About once/month	.72	.03		.08		.31	**	.22	**
Smaller management team meetings	About once/month	.99	.02		.13	**	.30	**	.19	**
Community work days	Less than once/month	.62	.11	*	.05		.16	**	.12	*
Sharing and Support			.19	**	.19	**	.35	**	.29	**
Materials exchange, gifting, or sharing	Less than once/month	1.00	.12	*	.12	*	.25	**	.24	**
Exchange or donation of services	Less than once/month	1.01	.15	**	.17	**	.25	**	.26	**
Skill sharing or training among neighbors	Less than once/month	.92	.09		.12	**	.28	**	.17	**
Babysitting, childcare exchange or cooperative	Never	1.18	.08		−.01		.11	*	.11	*
Carpooling	Less than once/month	1.16	.10	*	.12	*	.23	**	.22	**
Care and support of elderly neighbors	Less than once/month	.95	.13	**	.22	**	.18	**	.17	**
Care and support of sick or injured neighbors	Less than once/month	.78	.17	**	.17	**	.22	**	.14	**
Support of new parents	Less than once/month	.77	.07		.10	*	.25	**	.14	**
Voluntary financial aid or assistance between neighbors	Never	.67	.18	**	.14	**	.18	**	.14	**
Fellowship and Culture			.15	**	.22	**	.42	**	.39	**
Physical, spiritual, or mental wellness groups	Never	1.10	.10	*	.16	**	.18	**	.18	**
Movie or game nights, talent shows	Less than once/month	.68	.05		.08		.34	**	.31	**
Smaller dinner groups	Less than once/month	.99	.05		.07		.28	**	.22	**
Other special interest groups	Less than once/month	.84	.14	**	.22	**	.29	**	.28	**
Literature, arts, or crafts clubs	Never	.69	.09		.12	*	.20	**	.17	**
Live music, other art shows/performances	Less than once/month	.54	.03		.10	*	.23	**	.24	**
Parties, holiday celebrations	Less than once/month	.59	.03		.07		.28	**	.28	**
Other community traditions	Less than once/month	.62	.10	*	.16	**	.23	**	.24	**
Events that benefit the larger community	Less than once/month	.75	.19	**	.20	**	.30	**	.22	**
Stewardship of the Built Environment			.07		.05		.07		.01	
Routine building maintenance	Less than once/month	.95	.04		.04		.09		.01	
Construction projects	Less than once/month	.70	.10	*	.04		.01		.02	
Stewardship of the Natural Environment			.19	**	.21	**	.14	**	.13	**
Gardening, farming, or animal husbandry	About once/month	1.50	.24	**	.23	**	.13	**	.12	**
Routine grounds maintenance	Less than once/month	1.16	.06		.11	*	.04		.07	
Landscaping projects	Less than once/month	.98	.13	**	.17	**	.16	**	.08	

nature can be enhanced through covert responses to and interactions with features of the natural and built environment. Biophilic design (Kellert, Heerwagen, & Mador, 2008) is rooted in the biophilia hypothesis formulated by E. O. Wilson (1984) and is the attempt to support humans' innate affiliation with natural systems and processes through the design of the built environment. It is highly compatible with the theories and "pattern language" of Christoper Alexander et al. (Alexander, 1979; Alexander, Davis, Martinez, & Corner, 1985; Alexander et al., 1977; Salingaros, 2006; Salingaros & Masden, 2008). Many tenets of these theories can be traced to the organic architecture of Frank Lloyd Wright (1935, 1954, 1958, 2005, 2006, 2008).

Cohousing design has been influenced by the theories of Christopher Alexander et al. (Christian, 2003; Meltzer, 2005) and noted as a paragon of biophilic design (Louv, 2005; Moore & Cooper Marcus, 2008). Design features promoted in these architectural theories that may be present in cohousing and enhance residents' connection to nature include access to water, wild-growing gardens, greenhouses, compost, climbing plants, blurred boundaries between natural and built elements, and information-rich construction systems. The latter encompasses such features as solar energy and building with local materials, in a vernacular style, for natural conditioning (passive heating and cooling, daylighting, and natural ventilation), all features that promote awareness of natural

Table 5
Regressing INS on duration of residence, demographics, and practices.

INS	Model 1			Model 2			Model 3				
Predictor	*B*		SE(*B*)	*B*		SE(*B*)	*B*		SE(*B*)	*Beta*	
Sex[a]	−.42	**	.14	−.42	**	.14	−.31	*	.15	−.10	*
Age	.12	*	.06	. 12	*	.06	.14	*	.06	.11	*
Education	−.22	*	.09	−.22	*	.09	−.20	*	.09	−.11	*
Duration of Residence				.00		.01	−.00		.01	−.01	
Cohousing Core							−.04		.02	−.08	
Sharing and Support							.02		.01	.10	
Fellowship and Culture							.02		.02	.07	
Stewardship—Built							−.00		.04	−.00	
Stewardship—Natural							.06	**	.02	.16	**
N	459			456			434				
F(df)	6.17(3, 455)**			4.79(4, 451)**			4.63(9, 424)**				
ΔR^2				.00			.05				
Overall R^2	.04			.04			.09				
Adjusted R^2	.03			.03			.07				

*$p < .05$, **$p < .01$.
[a] Male = 1.

Table 6
Regressing CNS on duration of residence, demographics, and practices.

CNS	Model 1		Model 2		Model 3		
Predictor	*B*	SE(*B*)	*B*	SE(*B*)	*B*	SE(*B*)	*Beta*
Sex[a]	−.21 **	.07	−.21 **	.07	−.13	.07	−.09
Age	.14 **	.03	.13 **	.03	.14 **	.03	.23 **
Education	−.09 *	.04	−.08 *	.04	−.07	.04	−.08
Duration of Residence			.03	.01	.01	.01	.05
Cohousing Core					−.02	.01	−.10
Sharing and Support					.01	.01	.10
Fellowship and Culture					.02 *	.01	.13 *
Stewardship—Built					−.02	.02	−.04
Stewardship—Natural					.03 **	.01	.20 **
N	455		452		433		
F(df)	13.47(3, 451)**		10.09(4, 447)**		9.38(9, 423)**		
ΔR^2			.00		.09		
Overall R^2	.08		.08		.17		
Adjusted R^2	.08		.07		.15		

*$p < .05$, **$p < .01$.
[a] Male = 1.

systems among residents. Future research might consider these features and their impact on connection to nature.

Other directions for future research include an examination of transformational practices among other types of intentional communities and conventional developments. Conceptually, connection to nature, connection to community, and transformational practices need further development. The psychological, behavioral, social, and environmental outcomes associated with connection to nature and community should to be validated within the context of intentional communities and associated with particular practices and types of practices. Further, the qualities of those transformational outcomes should be defined; these qualities include magnitude of effects, temporal properties (i.e., how long it takes for outcomes to emerge and how long they last.

5. Conclusions

Connection to community and connection to nature are characteristic of sustainable lifestyles in cohousing and can be enhanced through certain practices. A systematic understanding of these practices is important. This study contributes to such an understanding by classifying cohousing practices and validating their relationship to enhanced connection to nature and community.

Future research should expand the discussion to transformational environment-behavior patterns, a concept that can encompass human–environment transactions varying along the dimensions of place dependence (Stokols, 1981, 1988) and overtness of behavior. The present research focused on overt behavior in behavior settings and some less place- dependent practices. Behavior settings (Barker, 1968; Wicker, 1979, 1987), activities predictably recurring in bounded time-space locales with relevant objects, consist of place- dependent, overt behavior; examples in this study include common meals and community meetings. Activities studied consisting of overt behavior that are less place dependent include care and support for elderly neighbors and exchange of goods. Future research should investigate aspects of the physical environment of cohousing communities that elicit physiological, cognitive, and emotional responses relevant to connection to nature and community (place dependent, covert behavior); the physical features themselves may serve as proxies for measuring such transactions.

Traditional cohousing may remain a niche market with limited racial, socioeconomic, and ideological diversity amongst residents, but the cohousing movement as a whole is growing and evolving. Adaptations of cohousing and associated concepts, such as developer-driven cohousing, retrofit cohousing, senior cohousing, pocket neighborhoods, and ecovillages make the general concept of cohousing appealing and accessible to more people. Transformational cohousing practices, as building blocks of cohousing communities that enhance connectedness, should be vitally important in these extensions of traditional cohousing as well. Finally, although this discovery of transformational practices

Table 7
Regressing ICS on duration of residence, demographics, and practices.

ICS	Model 1		Model 2		Model 3		
Predictor	*B*	SE(*B*)	*B*	SE(*B*)	*B*	SE(*B*)	*Beta*
Sex[a]	−.23 *	.10	−.24 *	.10	−.08	.09	−.04
Age	.13 **	.04	. 11 **	.04	.02	.04	.03
Education	−.01	.06	−.01	.06	−.06	.06	−.05
Duration of Residence			.02 *	.01	.02 **	.01	.12 **
Cohousing Core					.10 **	.02	.31 **
Sharing and Support					.02 *	.01	.13 *
Fellowship and Culture					.04 **	.01	.19 **
Stewardship—Built					−.07 **	.03	−.12 **
Stewardship—Natural					.01	.01	.02
N	458		455		434		
F(df)	5.35(3, 454)**		5.10(4, 450)**		4.63(9, 424)**		
ΔR^2			.01		.23		
Overall R^2	.03		.04		.27		
Adjusted R^2	.03		.03		.26		

*$p < .05$, **$p < .01$.
[a] Male = 1.

Table 8
Regressing CPA on duration of residence, demographics, and practices.

CPA	Model 1		Model 2		Model 3		
Predictor	*B*	SE(*B*)	*B*	SE(*B*)	*B*	SE(*B*)	*Beta*
Sex[a]	−.11	.07	−.11	.07	−.02	.07	−.01
Age	.03	.03	.01	.03	−.04	.03	−.07
Education	.09	.04	.09 *	.04	.06	.04	.07
Duration of Residence			.01 *	.01	.01 *	.01	.10 *
Cohousing Core					.06 **	.01	.25 **
Sharing and Support					.01	.01	.08
Fellowship and Culture					.03 **	.01	.21 **
Stewardship—Built					−.06 **	.02	−.14 **
Stewardship—Natural					.01	.01	.04
N	452		449		428		
F(df)	2.72(3, 448)		3.18(4, 444)*		11.73(9, 418)**		
ΔR^2			.01		.17		
Overall R^2	.02		.03		.20		
Adjusted R^2	.01		.02		.18		

*$p < .05$, **$p < .01$.
[a] Male = 1.

cannot be divorced from its context in the particular social ecological structures of cohousing, many of the transformational practices identified may hold true outside of cohousing and can be integrated into non-cohousing neighborhoods.

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