RESEARCH PAPER

Assessing community resilience: A CART survey application in an impoverished urban community

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ABSTRACT

This article describes an application of the Communities Advancing Resilience Toolkit (CART) Assessment Survey which has been recognized as an important community tool to assist communities in their resilience-building efforts. Developed to assist communities in assessing their resilience to disasters and other adversities, the CART survey can be used to obtain baseline information about a community, to identify relative community strengths and challenges, and to re-examine a community after a disaster or post intervention. This article, which describes an application of the survey in a community of 5 poverty neighborhoods, illustrates the use of the instrument, explicates aspects of community resilience, and provides possible explanations for the results. The paper also demonstrates how a community agency that serves many of the functions of a broker organization can enhance community resilience.

Survey results suggest various dimensions of community resilience (as represented by core CART community resilience items and CART domains) and potential predictors. Correlates included homeownership, engagement with local entities/activities, prior experience with a personal emergency or crisis while living in the neighborhood, and involvement with a community organization that focuses on building safe and caring communities through personal relationships. In addition to influencing residents' perceptions of their community, it is likely that the community organization, which served as a sponsor for this application, contributes directly to community resilience through programs and initiatives that enhance social capital and resource acquisition and mobilization.

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Introduction

Growing attention to the importance of community resilience in disaster management policy and practice has resulted in the need for instruments to assess resilience at the community level. This article describes an application of the Communities Advancing Resilience Toolkit (CART) Assessment Survey which has been recognized as an important community tool to assist communities in their resilience-building efforts.¹ The field-tested instrument was developed to assist communities in assessing their resilience to disasters and other adversities. The CART survey can be used to obtain baseline information about a community, to identify relative community strengths and challenges, and to re-examine a community after a disaster or post intervention. This article

describes an application of the CART survey in a community of 5 poverty neighborhoods located in a southern United States metropolitan area that serves as a regional commercial and cultural center. The paper illustrates the use of the survey, explicates aspects of community resilience, and provides possible explanations for the results. The paper also demonstrates how a community agency that serves many of the functions of a broker organization can enhance community resilience.

Methods

Community sponsor

This CART application relied on community-based research in which a sponsoring organization defined

the community; contributed knowledge about, and insight into, the community; helped to plan and implement CART activities; and provided access to a survey sample.² The community sponsor for this application was Community Renewal International (CRI),³ a non-profit organization that seeks to rebuild safe and caring communities through personal relationships. CRI relies on 3 primary strategies to accomplish its mission. The first is a Community Renewal Team that works citywide to unite stakeholders as partners in building a stronger city. The second strategy involves the use of identified Haven Houses, private homes in which a local resident serves as a volunteer to assist neighbors on the block where they live. The third CRI strategy involves Friendship Houses which are homes built in low-income, high-crime areas that serve as community centers. A CRI Community Coordinator, along with his/her family, lives in each Friendship House and becomes an integral part of the neighborhood.

CRI performs some of the functions of a broker organization for the community, that is, an organization with ties to businesses, nonprofit organizations, and the public sector which can provide access to resources for the neighborhoods and their residents.^{4,5} CRI navigates and negotiates for resources through, for example, the Community Renewal Team. Facilitated navigation to, and facilitated negotiation for, resources have been recognized as effective ways to help individuals cope with adversity and to build the resilience of individuals, families, and communities.⁶

The CART survey

The theory-based,⁷ evidence-informed⁸ CART survey used in this application contained 21 core community resilience items to address 4 interrelated CART domains that both reflect and contribute to community resilience. The domains, which are described in the current online CART instruments manual⁹ and in early publications about CART,^{7,8} are: (1) Connection and Caring (including relatedness, participation, shared values, support and nurturance, equity, justice, hope, and diversity within the community); (2) Resources (including the community's natural, physical, information, human, social, and financial resources); (3) Transformative Potential (deriving from the ability of communities to frame collective experiences, collect and analyze relevant data, assess community

performance, and build skills); and (4) Disaster Management (addressing the community's prevention and mitigation, preparedness, response, and recovery activities). See [Table 1](#) which categorizes the 21 core community resilience items by domain.

The survey also queried demographics (age, sex, race, employment status, marital status), years of residence in the neighborhood, homeownership, prior experience with a personal emergency or crisis while living in the neighborhood, sources of emergency assistance, sources of connection to the neighborhood, and support for the organization that sponsored the application. With the exception of the sponsor support question, these additional survey items are available in the online CART instruments manual.⁹

Survey sample and administration

Approved by the University of Oklahoma Health Sciences Center Institutional Review Board, the CART survey was undertaken in late 2008 in 5 neighborhoods in Shreveport-Bossier, Louisiana, where CRI has a presence through Friendship Houses, Haven Houses, volunteers, and various community activities. Internal CRI estimates, based on 2000 Census data,¹⁰ indicate that the unemployment rate averaged 47% across the 5 neighborhoods and that an average of 31% of residents lived below the poverty level.

Matched purposive samples were obtained in each of the 5 neighborhoods by pairing households identified by CRI staff as having a connection to CRI with households on the same block not identified as having a connection to CRI. While CRI had some knowledge of the type and extent of residents' connection to CRI by households that participated in CRI activities, they had not measured the extent of support among those households that did not participate in CRI activities. Hence, a specific survey item addressing supporter status directly queried awareness of, and support for, CRI. When sampled, the matched groups of households were not distinct in terms of respondents' awareness of, and connection to, CRI as indicated by responses to the supporter status variable. Thus, the 2 groups were merged for analysis, creating a sample of 352 respondents.

Trained CRI staff and volunteers (who received some reimbursement for their time) administered the survey at households which had been notified by mail that CRI would be canvassing in their neighborhood.

Table 1. Core community resilience items^a by domains and perceptions of community resilience for the study sample.

Domain/Item/Overall Community Resilience	Mean ^b (SD)
Connection and Caring	4.22 (0.81)
1. People in my neighborhood feel like they belong to the neighborhood. ^c	4.35 (1.04)
2. People in my neighborhood are committed to the well-being of the neighborhood.	4.15 (1.03)
3. People in my neighborhood have hope about the future.	4.21 (1.00)
4. People in my neighborhood help each other.	4.24 (1.10)
5. My neighborhood treats people fairly no matter what their background is.	4.16 (1.11)
Resources	3.85 (0.83)
6. My neighborhood has the resources it needs to take care of neighborhood problems. ^d	3.71 (1.16)
7. My neighborhood has effective leaders.	3.94 (1.05)
8. People in my neighborhood are able to get the services they need.	3.85 (0.95)
9. People in my neighborhood know where to go to get things done.	3.87 (1.00)
Transformative Potential	3.97 (0.82)
10. My neighborhood works with organizations and agencies outside the neighborhood to get things done.	4.04 (1.00)
11. People in my neighborhood communicate with leaders who can help improve the neighborhood.	4.01 (1.01)
12. People in my neighborhood are aware of neighborhood issues that they might address together.	4.06 (1.00)
13. People in my neighborhood discuss issues so they can improve the neighborhood.	3.93 (1.04)
14. People in my neighborhood work together on solutions so that the neighborhood can improve.	3.94 (1.02)
15. My neighborhood looks at its successes and failures so it can learn from the past.	3.98 (1.01)
16. My neighborhood develops skills and finds resources to solve its problems and reach its goals.	3.87 (0.96)
17. My neighborhood has priorities and sets goals for the future.	3.95 (1.02)
Disaster Management	3.94 (0.86)
18. My neighborhood tries to prevent disasters.	4.05 (1.03)
19. My neighborhood actively prepares for future disasters.	3.85 (1.05)
20. My neighborhood can provide emergency services during a disaster.	3.93 (1.02)
21. My neighborhood has services and programs to help people after a disaster.	3.95 (1.00)
Overall Community Resilience	4.00 (0.71)

Notes. SD = Standard Deviation.

^aSome core community resilience items in this table are edited to save space. More precise item statements are contained in the CART instruments manual.⁹

^bResponse options: very strongly agree = 6, strongly agree = 5, agree = 4, disagree = 3, strongly disagree = 2, very strongly disagree = 1, no opinion = 3.5 (imputed).

^cPrimary community resilience strength.

^dPrimary community resilience challenge.

Training included instruction in community resilience, CART, and survey interviewing as well as practice in survey administration. Surveyors worked in teams of 2, walking through neighborhoods to the selected houses. One of the team members read the questionnaire to an adult living in the home while the other team member recorded responses.

Coding and data analysis

Community resilience scores

Six response options allowed respondents to indicate agreement with each survey item along a range from “very strongly disagree” to “very strongly agree,” coded from 1 to 6 respectively. There was no neutral response option, but respondents were allowed to indicate that they had no opinion. “No opinion” responses were coded as 0 and imputed as 3.5. Mean scores were calculated for each of the 21 individual core items, each of the 4 CART domains, and an overall community resilience score. When individual item responses were missing, the mean domain scores and the mean overall community resilience score were

calculated as the average of the remaining non-missing item scores for the particular domain. The primary community resilience strength and challenge were identified as relatively high and low scores, respectively, on the core community resilience items.

Demographic characteristics of study participants

Respondents were asked their age group (18–19 years, 20–29 years, 30–39 years, 40–49 years, 50–59 years, 60–69 years, 70 or more years); responses were collapsed into 2 categories (less than 60 years, 60 y or older) for analysis. Sex was categorized as male or female. Race/ethnicity data were collected across multiple categories (American Indian/Alaska Native, Asian/Asian American/Pacific Islander, Black/African American/Afro-Caribbean, White/Caucasian [not of Hispanic origin], Hispanic/Latino). Employment status response options included employed full-time, employed part-time, unemployed (not employed but looking for a job), and not employed and not looking for a job; responses were collapsed into 2 categories (employed, not employed) for analysis. Response options for marital status included married, divorced,

separated, widowed, never married, and other; responses were collapsed into 2 categories (married, not married) for analysis. Participants were asked how many years they had lived in their neighborhood (less than 5, 5–10, more than 10); responses were collapsed into 2 categories (10 or less, more than 10).

Other characteristics of study participants

A question “What connects you to your neighborhood?” included “cannot afford to move,” “convenient location,” and “own my home” as well as the following response options: “church,” “civic club,” “Friendship House,” “military,” “school,” “work,” and “other.” These latter response options were used to create a new variable—engagement. Respondents who selected one or more of the entities/activities comprising the engagement variable were deemed to be engaged; if none of these items was selected, the individual was considered to be not engaged.

Participants were asked if they had ever experienced a personal emergency or crisis while living in the neighborhood (yes, no). Those who had experienced an emergency or crisis were asked to select one or more options indicating sources of assistance.

Respondents were considered to be supporters of CRI if they indicated that they “belong to” some aspect of CRI (e.g., attend Friendship House functions, have taken Haven House training), volunteer regularly and do what they can to help CRI, and/or routinely offer to help and do so without being asked. Respondents who indicated a lesser level of awareness about and/or support for CRI (i.e., they support CRI “not at all;” they support CRI “not at all, but are aware of it;” or they are “aware of” CRI “and support it a little”) were considered non-supporters.

Correlates of domain, overall community resilience, strength, and challenge scores

A linear regression model was used to assess the association between covariates and each of the domain scores, the overall community resilience score, the community resilience strength, and the community resilience challenge. Covariates included neighborhood, supporter status, years lived in the neighborhood, age, sex, marital status, employment status, experience with an emergency/crisis while living in the neighborhood, homeownership, and engagement. A stepwise procedure was used to select significant covariates.

Results

Perceptions of community resilience

Perceptions of community resilience are reflected by the 21 core community resilience item, 4 domain, and overall community resilience scores. Means and standard deviations for each of these community resilience scores are presented in Table 1. Mean core community resilience item scores ranged from 3.71 to 4.35 (where 1=very strongly disagree and 6=very strongly agree). The Connection and Caring domain had the highest mean domain score and Resources had the lowest mean domain score. See Table 1.

The highest mean score was associated with the survey item: “People in my neighborhood feel like they belong to the neighborhood,” making this the primary community resilience strength. The lowest mean score was associated with the survey item: “My neighborhood has the resources it needs to take care of neighborhood problems (resources include money, information, technology, tools, raw materials, and services),” making this the primary community resilience challenge. Both the primary strength and the primary challenge were considered to be sufficiently distant from the next closest scores that no other strengths and challenges were considered. This decision was made easier by the fact that scores in greatest proximity to the high score fell within the same domain (Connection and Caring), and most scores in greatest proximity to the low score fell within the same domain (Resources). See Table 1.

Characteristics of study participants

Demographic characteristics

Demographic characteristics of the sample are presented in Table 2. More than 60% of respondents lived in their neighborhood for more than 10 years, were homeowners, and cited homeownership as a source of connection to their neighborhood, and many cited homeownership as the most important source of connection. See Table 2 for other major sources of connection. Compared to non-homeowners, homeowners were significantly more likely to have lived in the neighborhood more than 10 years, to be 60 y of age or older, to be married, and to have experienced a prior emergency or crisis while living in the neighborhood. Homeowners were significantly less likely than non-homeowners to be engaged in one or more of the

Table 2. Characteristics of study participants (N = 352).

Characteristic of Study Participants	Frequency (%)
Age group	
18–19 years	14 (4.0)
20–29 years	44 (12.5)
30–39 years	39 (11.1)
40–49 years	66 (18.8)
50–59 years	82 (23.3)
60–69 years	52 (14.8)
70+ years	53 (15.1)
Missing	2 (0.6)
Sex	
Male	114 (32.4)
Female	225 (63.9)
Missing	13 (3.7)
Race/ethnicity	
American Indian/Alaska Native	11 (3.1)
Asian/Asian American/Pacific Islander	4 (1.1)
Black/African American/Afro-Caribbean	296 (84.1)
White/Caucasian, not of Hispanic origin	33 (9.4)
Hispanic/Latino	2 (0.6)
Other	6 (1.7)
Missing	0 (0.0)
Employment status	
Full-time employed	141 (40.1)
Part-time employed	46 (13.1)
Unemployed (not employed, looking for job)	33 (9.4)
Not employed and not looking for a job	38 (10.8)
None of these	89 (25.3)
Missing	5 (1.4)
Marital status	
Married	79 (22.4)
Divorced	63 (17.9)
Separated	29 (8.2)
Widowed	52 (14.8)
Never Married	77 (21.9)
Other	50 (14.2)
Missing	2 (0.6)
Years lived in neighborhood	
Less than 5	88 (25.0)
5–10	37 (10.5)
More than 10	221 (62.8)
Missing	6 (1.7)
Homeowner	
Yes	219 (62.2)
No	133 (37.8)
Missing	0 (0.0)
Sources of connection to neighborhood ^a	
Cannot afford to move	90 (25.6)
Church	126 (35.8)
Civic club	5 (1.4)
Convenient location	170 (48.3)
Friendship House	69 (19.6)
Military	10 (2.8)
Own my home	219 (62.2)
School	82 (23.3)
Work	88 (25.0)
Other	43 (12.2)
Engagement	
Yes (engaged with one or more entities/ activities)	229 (65.1)
No (not engaged)	123 (34.9)
Experienced an emergency/crisis while living in neighborhood	
Yes	189 (53.7)
No	155 (44.0)
Missing	8 (2.3)
Sources of emergency assistance ^{a,b}	
No one	23 (12.3)
Family member	148 (79.1)
Someone from the neighborhood	71 (38.0)
My church	73 (39.0)

(Continued)

Table 2. (Continued).

Characteristic of Study Participants	Frequency (%)
Friendship House	27 (14.4)
A local agency or organization	35 (18.7)
Co-worker(s)	28 (15.0)
Other	29 (15.5)
Support for sponsoring organization ^a	
Not at all	47 (13.4)
Not at all, but I am aware of it	88 (25.0)
I am aware of it and support it a little	122 (34.7)
I belong to some aspect of CRI	67 (19.0)
I volunteer regularly and do what I can to help CRI	47 (13.4)
I offer to help CRI routinely and help without being asked	46 (13.1)
Missing	3 (0.9)

Notes. ^aThe total percentage is greater than 100% since more than one response option was allowed.

^bIncludes only those who experienced an emergency/crisis while living in neighborhood.

entities/activities comprising the engagement variable. See Table 3. Mean community resilience scores were significantly higher for homeowners than non-homeowners on 8 core community resilience items, the Connection and Caring domain, the Resources domain, and the overall community resilience measure. See Table 4.

Other characteristics

More than one half of respondents indicated that they were connected to the community through one or more entities/activities, that is, engaged. Participants who were engaged via a local entity or activity, as compared to those not engaged, were significantly less likely to be homeowners, more likely to be employed, and more likely to be supporters of the sponsor. See Table 3. Mean community resilience scores were significantly higher for those engaged, as compared to those not engaged, on 4 core community resilience items and the Connection and Caring domain. See Table 4.

Slightly over one half of respondents had experienced a personal emergency or crisis while living in their neighborhood. Many of these respondents indicated that family was a source of assistance during the emergency or crisis. Other major sources of assistance were churches and someone from the neighborhood. A number of participants indicated that no one helped them. See Table 2. Participants who had experienced an emergency or crisis, as compared to those who had not, were significantly more likely to be female, to be homeowners, and to have lived in the neighborhood more than 10 y. See Table 3. Mean community

Table 3. Associations between specific characteristics of study participants and homeownership, prior experience with an emergency, engagement, and supporter status.

Characteristic of Study Participants	Homeowner Proportions (%) p value	Engagement Proportions (%) p value	Prior Emergency Proportions (%) p value	Supporter Proportions (%) p value
Age (<60 vs ≥60 years)	56.3 vs 76.2* 0.0005	66.9 vs 61.0 0.3275	51.7 vs 63.4 0.0566	30.6 vs 32.4 0.8013
Sex (Male vs Female)	59.7 vs 62.2 0.7233	64.9 vs 66.7 0.8083	47.8 vs 59.6* 0.0473	26.3 vs 34.7 0.1390
Employment status (Not employed vs Employed)	60.6 vs 63.1 0.6584	56.9 vs 72.7* 0.0022	55.7 vs 53.6 0.7433	33.1 vs 29.4 0.4864
Marital status (Not married vs Married)	58.3 vs 76.0* 0.0054	65.3 vs 64.6 0.8941	52.3 vs 64.1 0.0707	31.4 vs 30.4 1.000
Years in neighborhood (≤10 vs >10)	44.0 vs 72.9* <0.0001	71.2 vs 62.0 0.0997	47.6 vs 60.0* 0.0312	27.2 vs 33.5 0.2770
Homeowner (No vs Yes)	—	74.4 vs 59.4* 0.0040	47.7 vs 59.3* 0.0436	24.8 vs 34.7 0.0575
Engagement (No vs Yes)	72.4 vs 56.8* 0.0040	—	56.7 vs 54.0 0.6511	22.8 vs 35.4* 0.0157
Experienced an emergency/ crisis while living in neighborhood (No vs Yes)	56.8 vs 67.7* 0.0436	66.5 vs 64.0 0.6511	—	27.7 vs 33.9 0.2429
Supporter (No vs Yes)	58.9 vs 69.7 0.0575	60.9 vs 74.3* 0.0157	52.7 vs 59.8 0.2429	—

Notes. All p values are based on Fisher's exact test.

*Significantly different.

resilience scores were significantly lower for those who had experienced an emergency, as compared to those who had not, on 5 core community resilience items and the Resources domain. See Table 4.

Less than one half of respondents were considered to be supporters of the sponsoring organization. See Table 2 for specific information about degree of support and non-support. Relative to non-supporters, supporters of the sponsoring organization were significantly more likely to be engaged in one or more entities/activities comprising the engagement variable, and their mean community resilience scores were significantly higher for 6 core community resilience items, the Transformative Potential domain, and the overall community resilience measure. See Tables 3 and 4.

Models of domain, overall community resilience, strength, and challenge scores

Significant correlates in the linear regression models, which are presented in Table 5, included homeownership (in 5 of the 7 models: Connection and Caring, Resources, overall community resilience, primary strength, and primary challenge), engagement (in 3 models: Connection and Caring, overall community resilience, and primary strength), experience with a personal emergency (in 2 models: Resources and primary challenge), supporter status (in one model:

Transformative Potential), and age (in one model: primary strength). In each model for which the covariate was significant, community resilience scores correlated positively with affirmative responses related to homeownership, engagement, and support for the sponsor. Experience with an emergency or crisis while living in the neighborhood correlated negatively with the Resources domain and the primary community challenge (availability of resources within the neighborhood); that is, individuals who had experienced an emergency or crisis were less likely to agree that the neighborhood had necessary resources. The primary community strength was positively correlated with older age (60 y of age and older) as well as homeownership and engagement. No correlates were significant for the Disaster Management domain.

Discussion

The results of this CART survey application can be used to explicate aspects of community resilience and to illustrate the potential role of broker organizations in building community resilience. These results are discussed along with limitations of the study.

Associations between community resilience scores and study participant characteristics

Community resilience scores represent the perceptions of those who participated in the survey.

Table 4. Differences in community resilience scores between homeowners and non-homeowners, those with and without prior emergency experience, those engaged and not engaged, and supporters and non-supporters of the sponsoring organization.

Domain/Item/Overall Community Resilience	Homeowner MD (SD) p value	Engagement MD (SD) p value	Prior Emergency MD (SD) p value	Supporter MD (SD) p value
Connection and Caring	0.30 (0.79)* 0.0006	0.20 (0.80)* 0.0233	−0.15 (0.80) 0.0910	0.11 (0.81) 0.2243
1. People in my neighborhood feel like they belong to the neighborhood. ^a	0.35 (1.03)* 0.0055	0.26 (1.04)* 0.0435	−0.13 (1.04) 0.1442	0.06 (1.05) 0.5940
2. People in my neighborhood are committed to the well-being of the neighborhood.	0.46 (1.01)* 0.0002	0.29 (1.02)* 0.0036	−0.12 (1.02) 0.1371	−0.07 (1.03) 0.5610
3. People in my neighborhood have hope about the future.	0.16 (1.00) 0.0723	0.14 (1.00) 0.1914	−0.09 (1.00) 0.4331	0.20 (1.00) 0.0860
4. People in my neighborhood help each other.	0.29 (1.09)* 0.0348	0.09 (1.10) 0.5017	−0.14 (1.10) 0.2160	0.21 (1.10) 0.1290
5. My neighborhood treats people fairly no matter what their background is.	0.25 (1.10) 0.0833	0.25 (1.10) 0.0545	−0.26 (1.10)* 0.0406	0.16 (1.11) 0.2021
Resources	0.23 (0.82)* 0.0103	0.08 (0.83) 0.3944	−0.19 (0.82)* 0.0350	0.12 (0.83) 0.1968
6. My neighborhood has the resources it needs to take care of neighborhood problems. ^b	0.25 (1.16)* 0.0348	0.11 (1.16) 0.2288	−0.35 (1.14)* 0.0039	0.05 (1.16) 0.7413
7. My neighborhood has effective leaders.	0.35 (1.04)* 0.0042	0.10 (1.05) 0.2404	−0.02 (1.05) 0.9344	0.25 (1.05)* 0.0390
8. People in my neighborhood are able to get the services they need.	0.23 (0.95) 0.0583	0.03 (0.95) 0.6958	−0.19 (0.94) 0.1088	0.13 (0.95) 0.2557
9. People in my neighborhood know where to go to get things done.	0.09 (1.00) 0.5173	0.09 (1.00) 0.3882	−0.18 (1.00) 0.1341	0.07 (1.00) 0.5667
Transformative Potential	0.17 (0.82) 0.0542	0.13 (0.82) 0.1529	−0.12 (0.81) 0.1812	0.25 (0.81)* 0.0074
10. My neighborhood works with organizations and agencies outside the neighborhood to get things done.	0.14 (1.00) 0.1987	0.30 (0.99)* 0.0011	−0.09 (1.00) 0.7033	0.32 (0.99)* 0.0051
11. People in my neighborhood communicate with leaders who can help improve the neighborhood.	0.13 (1.01) 0.3995	0.16 (1.01) 0.1339	−0.23 (1.01)* 0.0394	0.31 (1.00)* 0.0084
12. People in my neighborhood are aware of neighborhood issues that they might address together.	0.08 (1.00) 0.5236	0.00 (1.01) 0.7202	0.00 (1.00) 0.9439	0.21 (1.00) 0.0932
13. People in my neighborhood discuss issues so they can improve the neighborhood.	0.25 (1.04)* 0.0326	0.22 (1.04)* 0.0300	−0.14 (1.04) 0.1633	0.24 (1.04)* 0.0487
14. People in my neighborhood work together on solutions so that the neighborhood can improve.	0.18 (1.01) 0.1402	0.15 (1.01) 0.1114	0.01 (1.02) 0.8944	0.35 (1.00)* 0.0028
15. My neighborhood looks at its successes and failures so it can learn from the past.	0.20 (1.01) 0.2690	0.15 (1.01) 0.2040	−0.24 (1.01)* 0.0187	0.26 (1.00)* 0.0278
16. My neighborhood develops skills and finds resources to solve its problems and reach its goals.	0.27 (0.96)* 0.0294	0.04 (0.96) 0.4273	−0.14 (0.96) 0.1124	0.18 (0.96) 0.1225
17. My neighborhood has priorities and sets goals for the future.	0.14 (1.02) 0.4467	0.01 (1.02) 0.7465	−0.12 (1.01) 0.3277	0.15 (1.02) 0.2166
Disaster Management	0.16 (0.86) 0.1224	0.08 (0.86) 0.3806	−0.12 (0.86) 0.1839	0.07 (0.86) 0.4961
18. My neighborhood tries to prevent disasters.	0.27 (1.03)* 0.0192	0.09 (1.04) 0.2225	−0.12 (1.04) 0.2207	0.11 (1.04) 0.3783
19. My neighborhood actively prepares for future disasters.	0.10 (1.06) 0.6675	0.13 (1.05) 0.2432	−0.26 (1.04)* 0.0195	−0.02 (1.06) 0.9004

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Table 4. (Continued).

Domain/Item/Overall Community Resilience	Homeowner MD (SD) p value	Engagement MD (SD) p value	Prior Emergency MD (SD) p value	Supporter MD (SD) p value
20. My neighborhood can provide emergency services during a disaster.	0.13 (1.02) 0.2438	0.10 (1.02) 0.4013	−0.06 (1.03) 0.3891	0.05 (1.02) 0.6705
21. My neighborhood has services and programs to help people after a disaster.	0.12 (1.00) 0.2541	0.02 (1.01) 0.3332	−0.05 (1.01) 0.7337	0.10 (1.00) 0.4231
Overall Community Resilience	0.21 (0.70)* 0.0063	0.13 (0.71) 0.1061	−0.14 (0.71) 0.0699	0.16 (0.71)* 0.0497

Notes. MD = Mean Difference; SD = Standard Deviation.

*Significantly different.

^aPrimary community resilience strength.

^bPrimary community resilience challenge.

Correlates of these scores suggest possible predictors for various core community resilience items, the CART domains, and the overall community resilience measure.

Homeownership

It is not surprising that homeownership was positively associated with the Connection and Caring domain, Resources domain, overall community resilience, primary strength (sense of belonging), and primary challenge (availability of resources) scores. The purchase of a house suggests commitment to, and investment in, a community (part of the Connection and Caring domain) which likely contribute to a sense of belonging. People may be more likely to purchase homes where they expect to

find support systems (part of the Resources domain) necessary to sustain their family. Moreover, the purchase of a home may suggest greater anticipated permanence within a community which may encourage homeowners to learn more about available community resources both before and after purchasing a home. Homeowners in this community were more likely than non-homeowners to think that their neighbors are committed to the well-being of the neighborhood, that they help each other, and that they discuss issues so they can improve the community, all of which may lead to increased participation in community organizations and contribute to a sense of belonging (both part of the Connection and Caring domain). Homeowners in this community also were more likely than non-

Table 5. Significant correlates in linear regression models of domains, overall community resilience, primary strength, and primary challenge.

Dependent Variable (R^2)	Independent Variable	DF	Parameter Estimate	Standard Error	t value	Pr > t
Connection and Caring ($R^2 = 5.59\%$)	Intercept	1	3.84078	0.09494	40.46	<.0001
	Homeowner	1	0.34140	0.08738	3.91	0.0001
	Engagement	1	0.25734	0.08885	2.90	0.0040
Resources ($R^2 = 3.46\%$)	Intercept	1	3.80619	0.08365	45.50	<.0001
	Emergency	1	−0.21763	0.08911	−2.44	0.0151
	Homeowner	1	0.25303	0.09165	2.76	0.0061
Transformative Potential ($R^2 = 1.36\%$)	Intercept	1	3.91002	0.05093	76.77	<.0001
	Supporter	1	0.20936	0.09619	2.18	0.0302
Disaster Management	No predictors were found.					
Overall Community Resilience ($R^2 = 3.32\%$)	Intercept	1	3.74662	0.08460	44.28	<.0001
	Homeowner	1	0.23746	0.07787	3.05	0.0025
	Engagement	1	0.16528	0.07918	2.09	0.0376
Primary Strength: People in my neighborhood feel like they belong to the neighborhood. ($R^2 = 7.2\%$)	Intercept	1	3.82346	0.12573	30.41	<.0001
	Homeowner	1	0.32466	0.11483	2.83	0.0050
	Engagement	1	0.32591	0.11497	2.83	0.0049
	Older	1	0.38154	0.12035	3.17	0.0017
Primary Challenge: My neighborhood has the resources it needs to take care of neighborhood problems (resources include money, information, technology, tools, raw materials, and services). ($R^2 = 3.95\%$)	Intercept	1	3.71011	0.11859	31.28	<.0001
	Homeowner	1	0.30794	0.12894	2.39	0.0175
	Emergency	1	−0.38138	0.12541	−3.04	0.0025

homeowners to think that their neighborhood has effective leaders and develops skills and finds resources to solve its problems and reach its goals, perhaps contributing to their greater perception that the community has the resources it needs to take care of its problems. Having sufficient finances to purchase and maintain a home also may create a greater sense of security in general and when a crisis occurs, which may contribute to differences in perception regarding the availability of resources, disaster prevention, and other aspects of overall community resilience.

Engagement

Engagement with one or more local entities/activities was positively associated with the Connection and Caring, overall community resilience, and primary strength (sense of belonging) scores. It also was positively associated with the perception that people are committed to the well-being of the neighborhood, that the neighborhood works with organizations outside the neighborhood to get things done, and that people in the neighborhood discuss issues so they can improve the neighborhood, all perhaps mutually reinforcing relationships. Engagement is likely to increase people's awareness of their community, thus perhaps explaining these perceptions among the engaged relative to those not engaged. These perceptions also may lead those who are engaged to think that they can make a difference, thus encouraging further engagement.

The importance of local engagement in disaster management is now well recognized in federal emergency management principles and policies.^{11,12} Involvement in emergency management activities was not measured in this study. While there was no observed relationship between engagement as measured here and disaster management for the community under consideration, the existence of a positive relationship across several core community resilience items, the Connection and Caring domain, and the overall community resilience measure suggests the potential importance of engagement for the resilience of communities, which ultimately may facilitate disaster management.

The engagement variable may be, in part, a measure of social embeddedness, one of 3 social support concepts (along with perceived social support and enacted support) that have been recognized as

important in disaster resilience.¹³ Social embeddedness refers to the connections that individuals have to significant others in their environments.¹⁴ As used here, the engagement variable is not just a measure of social embeddedness as an aspect of social support but also may indicate potential reciprocity in interaction (e.g., being available to provide social and other forms of support to others) as well as other aspects of resilience (e.g., knowledge of community resources). Moreover, connection via work (as opposed to coworkers) and/or school (as opposed to, e.g., classmates, teachers, counselors) does not necessarily imply social embeddedness, measured as connections to significant others, though social support may be provided through work and/or school.

Emergency experience

Experience with a personal emergency while living in the neighborhood was negatively associated with the Resources domain and primary challenge (availability of resources) scores as well as with the perception that people in the neighborhood communicate with leaders who can help improve the neighborhood and that the neighborhood treats people fairly, reviews its successes and failures so it can learn from the past, and actively prepares for disasters. Chronically high poverty, unemployment, and crime within these neighborhoods suggest that resources for local problem solving and skill development as well as knowledge of, and access to, services are limited, thereby resulting in relatively low endorsement of survey items associated with the Resources domain. It is likely unreasonable to expect large segments of the population who are impoverished and living with danger and insecurity on a daily basis to be able to anticipate and respond effectively to disasters without assistance.¹⁵ The very real lack of personal resources in this community suggests the dire circumstances that residents could encounter in an emergency or crisis, perhaps explaining, in part at least, differences in perceptions of those who have and have not experienced an emergency or crisis while living in this community.

Supporter status

Supporter status, measured by absence or presence of involvement with CRI, was a correlate of the

Transformative Potential domain and overall community resilience scores and was positively associated with the perception that the neighborhood has effective leaders and works with organizations outside the neighborhood to get things done as well as the perception that people in the neighborhood communicate with leaders, discuss issues, and work together on solutions so that they can improve the neighborhood. As part of its primary activities, CRI regularly seeks to identify, discuss, and attend to local issues; develop skills (e.g., computer literacy, leadership); address neighborhood problems; mobilize resources; and establish program goals, objectives, and priorities that enhance the community. As a result of their involvement with CRI, supporters are more likely than non-supporters to be aware of, and may be involved in, ongoing efforts within the community that contribute to these aspects of transformative potential.

Depending on the nature and extent of their participation in CRI, supporters may be aware that CRI serves some of the functions of a broker organization, though they are unlikely to use this terminology. For example, supporters may know of CRI's role with respect to community resource acquisition and mobilization which could influence supporters' perceptions of the transformative potential of their neighborhoods.

In addition to activities that contribute directly to transformative potential, CRI is intentional and articulate in its focus on the role of interpersonal relationships and the development of social capital. Social capital is increasingly recognized as an essential component of community resilience.^{16,17} Three types of social capital, all of which are fostered by CRI, have been described: bonding, bridging, and linking.^{16,18} Bonding social capital, which refers to associations among similar members of a group or community, is promoted by CRI's focus on building friendships, the Haven House program, and Friendship Houses. Bridging social capital, which refers to associations among dissimilar members of a community, is advanced through the CRI Adult Renewal Academy that offers educational programs. Linking social capital, which refers to connections with individuals, institutions, or networks that have greater power or authority, is promoted through the Community Renewal Team which brings together people and groups from across the city to advance the CRI community development agenda.

Age

Age was positively associated with the primary strength (sense of belonging), with respondents aged 60 and older more likely to endorse this item. Older age is likely to put individuals at increased risk for detrimental outcome associated with disasters to the extent that they experience greater problems associated with, among other things, health (e.g., sensory loss, chronic conditions, poor nutrition, immobility) and social and economic conditions (e.g., loss, social marginalization, diminished access to services, economic insecurity).¹⁹⁻²¹ Some evidence, however, suggests that older adults may be more resilient than younger people in the context of disasters, in part, because of their greater life experience and perspective.^{19,21} Elders also may make valuable contributions in the aftermath of disasters as a result of their knowledge, experience, and sense of history and their ability to serve in a variety of roles such as caregivers.²⁰ It is not clear whether these characteristics and dynamics are pertinent for this community or how they might affect a sense of belonging while apparently not affecting other aspects of community resilience.

Limitations

The low coefficient of determination (R^2) values for the linear regression models (see Table 5) suggest possible limitations in these models and specific survey items associated with them. Decisions made during the development of the CART survey,⁸ especially decisions regarding the core community resilience items, may have limited the models. Nonetheless, the models do suggest some presumably important associations of various determinants with the domain and the overall community resilience scores.

There may be problems with the wording of some survey items and/or the choice of potential predictor variables. For example, this application excluded income as a possible predictor because the sponsoring organization thought it might be a sensitive topic to query in the neighborhoods being studied. It is possible, of course, that an income variable might not have yielded significant findings precisely because poverty was a pervasive characteristic of the community.

The decision to create a variable for engagement in local activities/entities was made during data analysis based on the theoretical foundation of

CART and the importance of engagement in disaster management. The significance of the engagement variable as a co-variate in multiple models associated with this application suggests the importance of creating a better, more direct measure of engagement in future research. This issue is being pursued in new CART surveys.

In addition to potential limitations associated with the survey instrument and/or models, other aspects of survey methodology may have limited the findings. For example, the questionnaire was administered via interviews. Survey interviewers were selected from staff and residents who participated in training and practiced administering the instrument. While interviewer and/or responder bias cannot be ruled out, trained interviewers were considered by the sponsoring organization to be sufficiently qualified that they were used to conduct structured interviews for subsequent neighborhood surveys.

Summary and conclusion

The CART survey is a theory-based, evidence-informed instrument for assessing community resilience to disasters. Early applications of the survey, including the one described here, identified 4 interrelated domains: Connection and Caring, Resources, Transformative Potential, and Disaster Management.⁸ These domains are represented by the survey's 21 core community resilience items.

The present application in a community of 5 poverty neighborhoods illustrates the use of the CART survey to identify and explicate aspects of community resilience. The results suggest various dimensions of community resilience (as represented by the core community resilience items and domains) and potential predictors. Correlates included homeownership, engagement with local entities/activities, prior experience with a personal emergency or crisis while living in the neighborhood, and involvement with a community organization that focuses on building safe and caring communities through personal relationships. In addition to influencing residents' perceptions of their community, it is likely that the community organization, which served as a sponsor for this application, contributes directly to community resilience through programs and initiatives that enhance social capital and resource acquisition and mobilization.

Abbreviations

CART Communities Advancing Resilience Toolkit
CRI Community Renewal International

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