

# Systems change as an outcome and a process in the work of community collaboratives for health

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**Abstract** The widespread development of comprehensive community initiatives that aim to improve community health is driven by the need to change the systems charged with delivering the services and creating the policies related to a variety of health outcomes. Georgia's Family Connection initiative is the nation's largest statewide network of community collaboratives for health, with collaboratives operating in 159 counties. Data on community context, collaborative processes, engagement in systems change, and changes in programs and activities implemented, gathered consistently at the collaborative level over 3 years, will be used to answer the following questions. How do community contexts and the structure and processes of collaboratives affect implementation of systems change? How do systems changes affect intermediate outcomes such as the type of programs offered in a community? Longitudinal change in systems change and program implementation is described and significant predictors of between-collaborative variation in longitudinal change for each outcome are identified.

**Keywords** Collaboratives · Systems change · Human services · Comprehensive community initiatives

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## Introduction

Community coalitions rest conceptually on the notion that social problems are embedded in and their solutions are inextricable from the fabric of society (Hawkins, Catalano & Miller, 1992) and the corollary belief that community level efforts offer mechanisms frequently overlooked but often most appropriate for solving social problems (Wandersman, Goodman, & Butterfoss, 2004).

Traditional social problem solving approaches have tended to frame problem phenomena discretely and solutions categorically. For example, untreated early childhood health problems have usually been conceptualized as isolated events to be addressed by an array of autonomous, specialized health providers, such as public health or school nurses, pediatricians and audiologists. Although health has multiple social, political, economic, and cultural determinants, interventions are often narrowly focused and discipline bound, leading to inadequate response.

Prilleltensky and Nelson (2000) note the importance of collectivist values (including collaboration) to the promotion of child and family wellness. A systems approach reflects this perspective; both discrete community sectors and their interstices must be featured in problem solving. In the case of untreated early childhood health problems, they are considered best addressed conjointly by health providers, health educators, the media, businesspeople, child-care providers and parents, among others.

## The rationale for collaboration

Two theoretical orientations have helped provide a framework for the development of community collaboratives. Ecological theory suggests that the causes and solutions to health problems include forces outside the

individual. Consequently, there is an increased call to think about risk, protection, and resiliency as community level variables (Wagenaar & Perry, 1994). Secondly, systems theory points to the interdependence of the individual entities that make up the system. In his argument for community level health interventions, Holder (2002) advocates a systems approach that includes the modification of structures, environments and contexts.

Collaboration among the various organizations and systems that could potentially impact health has been seen as a means by which complex problems with interrelated causes can be addressed, a strategy for maximizing the efficient use of limited resources, a way of reducing the fragmentation within and between bureaucracies, a means of engaging citizens in a democratic process of decision-making, and a means of protection against rapid social change (University of Wisconsin Extension Service, 1998). In addition, community collaboratives for health can reduce duplication of services, build community capacity, create synergy, and most importantly, engage multiple disciplines in dealing with issues that have multiple causes and solutions (Emshoff, 2004). “They are vehicles for tapping into dominant community resources and creating synergy and trust among otherwise independent actors” (Mandell, 1999).

#### The growth of collaboratives

This theoretical rationale has been transformed into policy and funding for collaboration, notably in substance abuse prevention coalitions funded by the Center for Substance Abuse Prevention and the Robert Wood Johnson Foundation. In addition, both government and private (e.g., W.K. Kellogg Foundation, Kaiser Family Foundation) funding for addressing numerous health issues (e.g., violence, HIV, smoking) have required community collaboration as an intervention component.

The exponential growth of coalitions occurred without substantial empirical support for their effects on health outcomes (Hallfors, 2002; Roussos & Fawcett, 2000). However, there is an increasing literature on how collaboratives achieve more immediate and intermediate outcomes that are theoretically linked to these health outcomes. For example, Florin, Mitchell, Stevenson, and Klein (2000) report on the effects of collaborative process variables (e.g., organizational climate, member skill development) on a range of intermediate outcomes. The cross-site evaluation of the Community Coalitions Program (funded by the Center for Substance Abuse Prevention) used structural equation modeling to determine that a focus on prevention and community action led to a reduction in substance abuse and related behaviors (Crowley, Yu, & Kaftarian, 2000). Hays, Hays, DeVille, and Mulhall (2000)

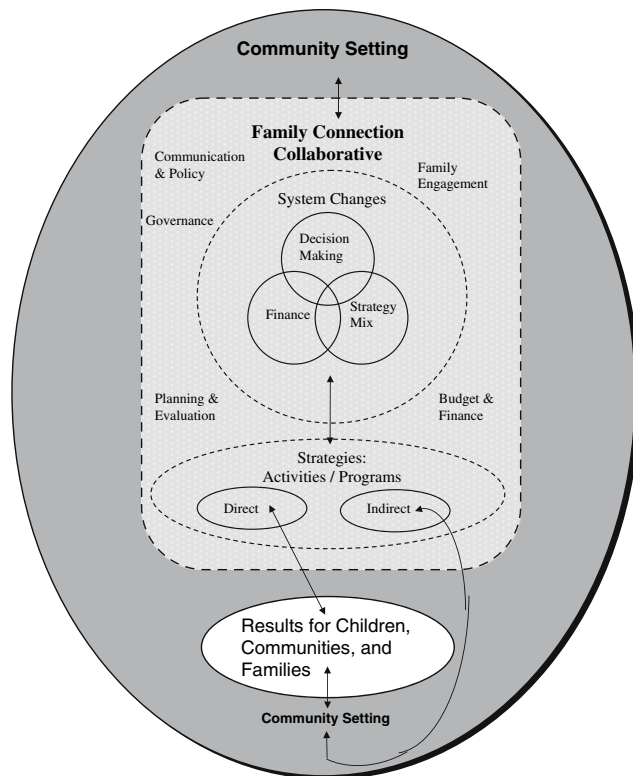
studied 28 coalitions in Illinois and reported on organizational and structural features (e.g., member diversity, sectoral representation, member participation, and collaboration) that had effects on the local prevention service system, local public policies, and the development of comprehensive plans.

One outcome of creating a collaborative representing multiple elements of the system is that the collaborative can be used to change the system itself. Roussos and Fawcett (2000) provide several examples of how community collaboratives have produced systems changes related to programs, policies, and practices. A collaborative structure has the potential to increase the individual and collective efficiencies of existing services, plug gaps in services and resources, share information, and create a means by which a variety of perspectives and stakeholders can share power and decision-making. This can be done in a manner that recognizes the broad needs of the community and its members. Thus, a truly realized collaborative is more than a collection of individually oriented and discipline-bound interventions, no matter how well coordinated, because of the potential for systems change that can only be achieved through active collaboration. As delineated by O’Looney (1996), “when services are integrated and communities are more organized, one can expect to begin to see changes in the lives of families and children” (p. 15), a value added to the traditional delivery of categorical services.

#### The current study

The current study seeks to link these literatures on the importance of systems and systems change with the growing literature on community collaboratives as a means of creating and changing systems. These constructs and their relationships are currently being studied in the context of the Family Connection Partnership, a network of 157 county-based collaboratives serving all 159 of Georgia’s counties to be described in more detail in the Method section. Weiss (1995) advocates for a theory of change for community coalitions, a term we will use interchangeably with community collaboratives, though some have made distinctions between the two. The work of Family Connection is guided by such a theory of change (see Fig. 1) which asserts that within a dynamic community context, the characteristics of a collaborative’s structure and processes, systems changes and a mix of strategies (component activities and programs) will interact to produce outcomes for children, families and communities (Metis Associates and EMSTAR Research, 2003). Each component of the theory is further described below and is operationally defined in the Method section.

Context refers to the setting in which the collaborative was formed and operates. Contextual variables include



**Fig. 1** FCP theory of change October 2005

physical space, social and economic conditions (Weiss, 1995; Connell, Aber, & Walker, 1995), political and health conditions, community infrastructure (Center for Substance Abuse Prevention 1995, unpublished manuscript), and other factors that affect “links between activities and outcomes” (Connell & Kubisch 1996, unpublished manuscript, p. 15). While context has long been understood to influence organizational functioning, in this case we will specifically examine the role of context as it affects the systems change behaviors of collaboratives.

Most immediately, the context influences the nature and characteristics of the collaborative—how it was formed, when it was formed, its size, its structure, its staffing and funding, how long it has been part of Family Connection, its mission and philosophy, and its resources. These are variables that describe what the collaborative “looks like.” It describes more of what the collaborative “is” instead of what it “does.”

Collaborative processes refer to the dynamics of how the collaborative operates and how the collaborative functions internally. It includes the processes of participation, leadership, communication, goal setting, collaboration, evaluation and coordination of services. The theory of change would propose that having participation from a broad base of community stakeholders, effective leadership, active communication, goal setting that is reflective of community needs, collaboration to meet these goals, evaluation to

inform action, and coordinated services will all improve the quality of services provided to children and families, and ultimately the health of the community.

The collaboratives have been charged with changing the “systems of services” to children and families. The term “systems changes” refers to changes in interorganizational and community systems that are conceptualized as the media through which results are achieved, or at least hastened and enhanced (Georgia Policy Council for Children and Families/Family Connection, 1997). There are three elements of systems change that are the targets for change—*decision-making*, *financing* and *collaborative and accessible service delivery*.

*Decision-making* refers to how the collaborative is governed (e.g., its governance structure, whether it has formal collaborative powers) as well as how decisions are made (and who makes these decisions) regarding the work of the collaborative and services for children and families. *Financing* encompasses how resources for improving community health are acquired and managed by the collaborative. A change in the finance system from “business as usual” might be reflected in increased use of blended funding, re-direction of existing resources, and leveraging of external funds. *Collaborative and accessible service delivery* focuses on how and what types of services (e.g., prevention vs. treatment) are created and delivered, rather than what specific services are delivered. Examples of these systems changes would be reflected in increased integration or coordination of services (e.g., wraparound services, shared staff, referrals), an increased focus on prevention, and increased family involvement in their delivery.

Systems changes are the radiating effects of collaborative activities on the area-wide system of care. The change area can be an entire county or a sub-county area such as a neighborhood or school district. Systems changes can occur within collaborative member or non-member organizations, or in networks of member and non-member organizations. What distinguishes a systems change is that it occurs outside the collaborative proper. That is, it is not a collaborative activity; it is a product of collaborative activity. Collaborative meetings, communication, committees, governance activities are all internal processes of the collaborative itself, and do not represent systems change. For example, a Truancy Prevention Task Force composed entirely of collaborative members and operating as a collaborative subcommittee is not a systems change, as this remains an internal process unless and until it acts on the external community. A Truancy Prevention Council that evolves from the Task Force and involves organizations that are not collaborative members is a systems change, because it has brought previously non-related entities together to change the way decisions are made. Further, a

new Truancy reduction program or policy, conceived and implemented as a result of Task Force or Council activity, is a systems change.

While systems change refers to how business is conducted, the actions (reflected in programs and activities) catalyzed or facilitated by the collaborative are the business itself. Actions include direct services (those that have specific clients, such as a mentoring program) and indirect services (those that are focused on the whole community, such as a legislative breakfast, leadership development, or a community report card) that are designed to build a better context or infrastructure for healthy families and children.

Ultimately, all of the work, from the development of a collaborative, to the institution of systems changes, to the delivery of services is undertaken to improve the lives of children and families. The current outcome categories are healthy children, children ready for school, students succeeding in school, strong families, and economically self-sufficient families.

In summary, the goal of the Family Connection collaboratives is to increase coordination and efficiency among the variety of services provided to children and families in the community. Collaborative processes are expected to be related to changes in the systems of services, which are expected to be related to an increase in collaborative-facilitated programs and activities.

To test these theoretical expectations, we asked the following questions. If systems are critical to our understanding of community health, and collaboratives are in an advantaged position for changing these systems, under what circumstances does systems change occur? In other words, what are the community context variables and collaborative characteristics related to a collaborative's success in changing systems? In addition, does system change lead to changes in the services that are delivered to children and families?

## Method

### Setting

Family Connection is a statewide network of 157 collaboratives serving the 159 counties (one collaborative serves three counties) in Georgia. The network formed in 1991 with 15 county-level collaboratives and has gradually expanded statewide until all counties were covered in 2002. The network is primarily supported by the Family Connection Partnership (FCP), the public/private nonprofit created and funded by the State of Georgia and the private sector. FCP also partners with state policy makers and state and national human service agencies, organizations, and foundations in its effort to link community priorities and

efforts to state decision makers and promote “what works” using research and evaluation.

Collaboratives are public/private partnerships made up of human service providers, community-based organizations, elected officials, business and civic leaders, faith-based organizations, and families and concerned citizens. They serve as local decision-making bodies for communities to improve outcomes. Each collaborative makes decisions about desired outcomes, creates a plan for achieving these outcomes, allocates resources, and holds itself accountable for child and family well-being. An allocation from the state provides a budget for a small staff, and in almost all cases, additional financial resources are generated or located to expand the internal and external functioning of the collaboratives. While the collaboratives themselves are not “programs” and their primary purpose is not to administer services, many make allocations to other service providers and some administer services directly.

### Data sources and variables

With the exception of the two community context scales described at the end of this section, the variables of interest were measured using the Self-Assessment survey. The Self-Assessment is an annual survey designed to help collaboratives reflect on their work during the preceding year and to shape reports for policy makers and funders, to guide decisions, and to publicize the work of local collaboratives.

Instructions for the Self-Assessment were consistent across years, directing the local collaboratives to engage multiple stakeholders in the completion of the survey. Specifically, in 2002 collaboratives were instructed to “Please give ample thought and time to completing the survey. Involve your board, planning and evaluation committee and other collaborative members in completion of the survey as a means of gathering information and reflecting on progress to date.”

The Self Assessment lists a number of collaborative member groups (e.g., collaborative coordinator, collaborative chair, governing board members, volunteers, consumers, etc.) and asks the respondent(s) to indicate how many people from each group participated in the completion of the Self Assessment. In 2002, collaboratives indicated that an average of 13 ( $SD = 11$ ) people from an average of 5 ( $SD = 3$ ) different collaborative member groups participated in the completion of the Self Assessment. The most common collaborative member to participate in the completion of the Self-Assessment was the collaborative coordinator, with the least common members involved being consumers and volunteers.

The Self-Assessment was used in this study to provide longitudinal data (2000–2002) on a variety of collaborative

characteristics and processes described below. Each variable is expected to have an effect on the ability of the collaborative to engage in systems changes and to choose and implement effective programs and activities reflecting the needs of the community. Each variable is further described below.

#### *Collaborative characteristics and processes*

Collaborative characteristics included sectoral representation, member involvement, tenure of the chair, formality of structure, and activity level. Sectoral representation reflects the number of people or agencies from the community that are represented in the collaborative. This construct is a critical component of the theory of change, as it represents the range of perspectives, disciplines, and constituencies participating. In the Self-Assessment, collaboratives indicate from a list of possible community sectors (e.g., board of education, chamber of commerce, business, Department of Family and Children Services) which sectors exist in their community, as well as which of the sectors that exist in the community are represented on the collaborative. The sectoral representation variable is created by dividing the number of sectors that are represented on the collaborative by the number of sectors that exist in the community, and then multiplying by 100 to obtain a percent.

Member involvement represents the average level of involvement that the various sectors represented on the collaborative have with the collaborative. Thus, it is an attempt to go beyond the level of membership to assess the engagement of participants. In the Self-Assessment, collaboratives indicate whether each sector represented on the collaborative is a part of the governing board for the collaborative or not. Further, the collaboratives indicate whether each sector has a slight, moderate, or extensive level of involvement with the collaborative. The levels of involvement, therefore, range from 1 to 6, with the lower three levels representing involvement of those sectors not on the governing board (1 = slight, 2 = moderate, 3 = extensive) and the higher three levels representing those on the governing board (4 = slight, 5 = moderate, 6 = extensive). Member involvement was calculated by dividing the sum of the levels of involvement for each sector represented on the collaborative by the number of sectors represented on the collaborative.

Most collaboratives are governed by a board and all are headed by a chair. The tenure of the chair variable reflects how long (in months) the collaborative's chair has been in office. Formality of structure refers to the collaborative's organizational structure. Collaboratives are asked to indicate whether their governance type best reflects "meet & confer", "advisory body created by ordinance", "private non-profit body", or "quasi-governmental body". The

variable is considered continuous and ordinal, with "meet & confer" being the lowest level of organizational structure (given a value of 1) and "quasi-governmental" being the highest (given a value of 4).

Each of these variables represents an assessment of the maturity and stability of the collaborative, and thus its readiness to engage in systems change.

Activity level refers to the collaborative's perception of how much energy the collaborative has and the level of activity the collaborative engages in. The variable is measured with one question that states, "Rate your collaborative on a 1–7 scale where 1 represents a collaborative that meets infrequently, has made few decisions, has undertaken few systems changes and/or service initiatives, and has a low level of energy and 7 represents the same indicators with high levels."

#### *Systems change*

Three indices of systems change were created to represent decision-making, finance, and collaborative and accessible service delivery (hereafter referred to as collaborative service delivery). Items within each category of systems change that were consistently included in the Self-Assessment for all 3 years were used to compute each of the three indices (see Appendix). Responses indicating whether the collaborative had engaged in a specific systems change activity during the previous year were given a score of either 0 (no) or 1 (yes). These scores were then summed to indicate the number of systems change activities for each index were engaged in by each collaborative.

Three items make up the decision-making index, which reflects collaboratives' efforts to make decision-making more inclusive (e.g., community involvement: forums, town meetings, focus groups, task forces, councils, etc.). Therefore, scores on this index may range from 0 to 3. Seven items make up the finance index, which reflects collaboratives' efforts to create and share financial resources (e.g., blended funding). Scores on this index may range from 0 to 7. Fourteen items make up the collaborative service delivery index, which reflects the strategies collaboratives engage in an effort to make service delivery more collaborative (e.g., common intake, co-located staff, interagency case management) and more accessible (neighborhood-based, culturally competent). Scores on this index may range from 0 to 14.

#### *Programs and activities*

Collaboratives provide a vehicle by which programs and activities intended to build a better context or infrastructure for healthy families and children may be created. They may provide (or facilitate or act as a catalyst for) direct services

(such as mentoring or parenting skills programs) and/or indirect services (those focused on the community, such as leadership development, legislative breakfasts, or public awareness campaigns) toward that end. These programs and activities are expected to be influenced by the systems changes the collaborative engages in and are expected to result in improved outcomes for children and families.

The program array variable represents the breadth of programs and activities that are at least partially supported by the collaborative. In small counties, this work may represent the majority of all services in the county, while in large counties, the collaborative programs and activities may represent a small percentage of the county's related initiatives. Collaboratives indicate whether they engage in a variety of programs and activities that fall under eight different categories, including: academic development, child development, economic development, family development, mental health development, physical health development, youth development, and "other" strategies (includes housing, transportation, legal or immigration services, and community education/awareness). Program array ranged from 0 to 8 and represents the number of different categories in which collaboratives facilitated or provided programs and activities.

#### Community context

Two scales representing aspects of the community were created for each county using data from the Georgia County Guide (Center for Agribusiness, 2002) that reflect the state of the community in 2000. SES was chosen for the analysis because it may influence both the collaboratives' and the community members' access to important community resources. The SES scale is comprised of 9 variables including: (1) per capita income, (2) percent of

homes that are mobile homes, (3) percent of the population receiving public disability assistance, (4) percent of the population receiving food stamps, (5) percent of the population receiving public assistance, (6) percent of the population filing bankruptcy, (7) the unemployment rate, (8) the percent of people age 25 and older who have completed high school, and (9) a variable called pull factor that measures a county's retail buying power. Scores were reverse scored as needed so that higher scores on the index reflect higher SES. Scores on each variable were then standardized before summing into the scale ( $\alpha = .85$ ).

Community vibrancy (growth and vitality) was chosen because it may influence access to resources, as well as the collaboratives' readiness and ability to collaborate and address the health of the community. The four variables in the scale include: 1) the number of building permits issued for new privately owned residential housing per 100,000 people, 2) percent of the population aged 18–44, 3) percent change in the number of housing units from 1990 to 2000, and 4) percent of housing units that are occupied. Scores on each variable were standardized before summing into the scale ( $\alpha = .51$ ).

#### Results

Intercorrelations between all variables are shown in Table 1. Given that data for each variable described above (except SES and community vibrancy) were available for 3 years (2000–2002) for each of the 157 community collaboratives (CCs) in the sample, multilevel modeling was used to examine differences in longitudinal change between CCs. Most multilevel modeling studies begin with a basic description of the multilevel structure of the data. For this study, Level I units are the multiple time points for

**Table 1** Intercorrelations ( $r$ ) between systems change, community context, collaborative characteristics, and programs ( $n = 417$ )

		1	2	3	4	5	6	7	8	9	10	11
1	Decision-making	–	.36	.23	.12	.15	.07	.06	–.08	–.01	.12	.10
2	Collab. service delivery		–	.48	.07	.10	.11	.16	.05	.05	.07	.19
3	Finance			–	.10	.13	.04	.16	.10	.09	.14	.17
4	SES				–	.60	–.16	.03	.18	.19	.28	.00
5	Community vibrancy					–	–.17	–.04	.10	.14	.15	–.08
6	Tenure of chair						–	.10	.04	–.06	.00	.09
7	Activity level							–	.22	.15	.14	.10
8	Sectoral representation								–	.74	.19	.04
9	Involvement									–	.33	.03
10	Formal structure										–	.21
11	Program array											–

*Note.* Correlation coefficients calculated across the three waves of measurement. Correlations greater than .11 are statistically significant ( $p < .05$ )

each variable, and the Level II units are the CCs for which each variable is measured at multiple time points. Thus, multiple time points are nested within CCs. The primary advantage of multilevel modeling for analysis of longitudinal data is that it accounts for the nonindependence of residuals within Level II units, in this case CCs (Luke, 2005). A linear regression equation was fit to describe the effect of time on outcomes for the sample of CCs. At Level II, the regression parameters from the Level I equation, the intercept and slope associated with the predictor, time, are treated as outcomes to answer a series of questions: (1) does the general Level I regression equation fit equally well for all CCs, or is there significant variability in either intercepts or slopes, and (2) what Level II variables predict variance in intercepts and slopes? Note that in a longitudinal study, Level II predictors would be non-time-varying—characteristics of CCs that are constant across time, because time is accounted for at Level I.

A somewhat less common use of multilevel modeling for longitudinal data involves the entry of additional Level I predictors, when predictors are also available longitudinally. Because most of the predictors in this study were time-varying (i.e., they had unique values in each year) they were entered as additional predictors in the Level I model, to test for their effects above and beyond the effect of time. The effect of any predictor can be evaluated by the size and direction and statistical significance of its regression coefficient, by the proportion reduction in the residual variance term for the particular equation in which a predictor is entered, and by the change in overall model fit associated with the addition of predictors. The reader is referred to Bryk and Raudenbush (2002) for a more detailed explanation of multilevel modeling, and to Singer and Willett (2003) for a detailed explanation of the uses of multilevel modeling for longitudinal data analysis.

The analyses for the present study are divided into two sections. In the first section, longitudinal change in the three indices of systems change is examined over collaborative age. Then Level I & II predictors of longitudinal change in each systems change index are entered. Predictors of systems change include two community context covariates, SES and community vibrancy, and five characteristics of collaboratives—tenure of chair, collaborative vitality, sectoral representation, member involvement, and formality of structure. Then, in the second section of the analysis systems change is treated as a predictor of the number of types of programs and activities implemented by collaboratives.

The marker of time in these analyses is age of the collaborative rather than calendar year due to the fact that collaboratives were initiated in different years, and the variables in these analyses are more likely to be dependent on collaborative age at the time of measurement, rather

than the calendar year. The age variable was computed by subtracting the year of formation from the year of measurement, so an age value of 0 indicates a collaborative's first year of existence.

### Prediction of systems change

Descriptive statistics for the three systems change indices and predictors across collaborative age are shown in Table 2. Although each collaborative has only 3 years of data, by arranging the data according to age of collaborative, the analysis encompasses a much broader range of time. The table represents averages of datapoints at the full range of ages represented in the dataset.

Although it is a cross-sectional representation of the data, Table 2 provides initial descriptive information of the nature of change in each variable across time. Note that the systems change indices increased consistently over a collaborative's first 3 years, and differences from year to year became less consistent in later years of age. Increases in variance often accompanied increases in means across time (e.g., financing), which suggests divergence in systems change trajectories across time. Figure 2 below illustrates the nature of longitudinal change in the collaborative service delivery index for a sample of 10 randomly selected collaboratives. A sample was chosen to more clearly illustrate these trajectories which become indistinguishable when all 157 trajectories are displayed.

Collaborative trajectories for the collaborative service delivery index of systems change across the age span illustrate that most of the collaboratives in this random subsample experience increases in systems change at early and later ages, although there were also CCs demonstrating growth followed by decline and some with consistent declines as well. Next a series of multilevel models was run to examine the nature of longitudinal change across all CCs. For each systems change index, a base model with time as a single fixed effect was compared to a predictor model with community context variables and collaborative characteristics as predictors of variation in slopes and intercepts across CCs. The SPSS mixed models function was used for these analyses.

Base models, with age as the sole fixed effect, were run for each of the three systems change indices, with random effects for intercepts and slopes. None of the three base models converged, suggesting that there were not sufficient data to estimate random effects for both intercepts and slopes, therefore the random effect for the slope associated with age was removed. Removal of the slope random effect improved the fit of the models for collaborative service delivery and financing, though not for decision-making. The consistently poor fit of the decision-making model is probably due to the limited range of values for this variable

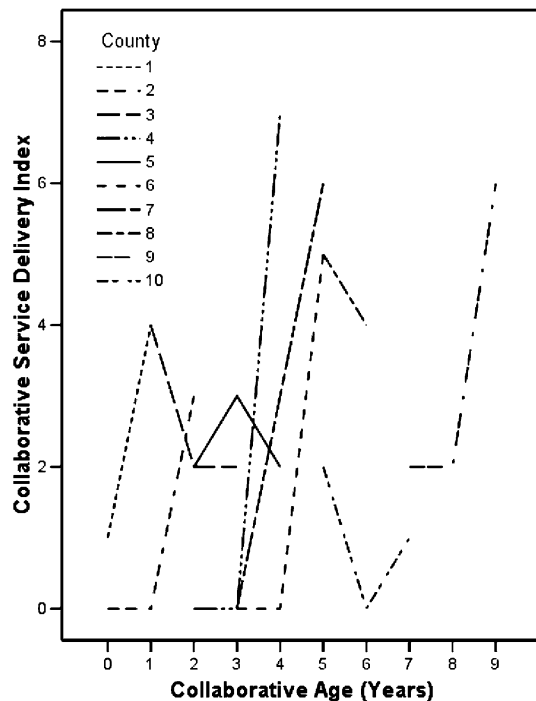
**Table 2** Means and standard deviations for systems change, community context, and collaborative characteristics across age

Age of CC	Decision-making	Collab. service delivery	Finance	SES	Comm. vibrancy	Tenure of chair	Activity level	Sectoral rep.	Invlimt	Formal structure	Program array
-2 (n = 3)	-	-	-	-3.53 (8.61)	-.81 (4.09)	-	-	-	-	-	-
-1 (n = 11)	-	-	-	-.60 (7.89)	-.07 (2.35)	-	-	-	-	-	-
0 (n = 27)	.63 (.65)	2.17 (2.35)	.38 (.58)	-1.98 (5.87)	-.85 (1.95)	-6.91 (6.02)	-.37 (.99)	-4.65 (15.03)	-.40 (1.25)	-.90 (.79)	.04 (.19)
1 (n = 68)	.75 (.72)	3.35 (2.47)	.67 (.93)	-1.50 (5.53)	-.49 (1.88)	-1.30 (10.96)	-.17 (1.14)	-.51 (14.05)	-.11 (1.04)	-.58 (.96)	2.56 (2.19)
2 (n = 75)	.82 (.73)	3.41 (2.17)	.75 (1.05)	-.99 (5.94)	-.34 (2.21)	1.83 (14.79)	-.11 (1.27)	.95 (12.94)	-.07 (1.03)	-.40 (1.10)	3.69 (2.42)
3 (n = 75)	.92 (.79)	3.09 (2.67)	.92 (1.11)	-.16 (6.05)	.01 (2.23)	2.07 (16.87)	.04 (1.04)	-4.69 (20.51)	-.12 (1.13)	-.04 (1.13)	4.21 (2.19)
4 (n = 31)	1.13 (.90)	4.43 (2.91)	.97 (1.13)	1.49 (6.51)	.43 (2.55)	.48 (17.88)	-.20 (1.71)	-2.54 (23.81)	-.03 (1.23)	.34 (1.09)	4.55 (2.66)
5 (n = 41)	.83 (.79)	3.46 (2.36)	1.03 (1.40)	.13 (5.58)	-.14 (2.05)	1.30 (16.31)	.25 (1.24)	1.48 (21.37)	.22 (1.20)	.51 (.97)	4.22 (2.43)
6 (n = 40)	.56 (.66)	2.59 (2.30)	.91 (1.00)	.92 (5.79)	.02 (2.25)	-.94 (21.21)	.40 (.81)	7.81 (15.07)	.38 (.99)	.41 (.95)	4.03 (2.57)
7 (n = 55)	1.07 (.90)	3.65 (2.64)	1.13 (1.09)	1.26 (5.71)	1.9 (2.12)	-.37 (20.17)	.13 (1.22)	4.56 (17.30)	.19 (1.05)	.68 (.90)	4.22 (2.77)
8 (n = 30)	1.14 (1.01)	5.21 (4.13)	1.36 (1.47)	2.58 (5.27)	.62 (2.09)	-1.23 (13.10)	-.02 (1.62)	4.49 (16.34)	.32 (1.14)	.79 (.67)	4.80 (2.58)
9 (n = 15)	1.29 (.83)	4.14 (2.71)	1.14 (1.10)	2.16 (5.58)	.64 (1.73)	-1.19 (18.76)	.35 (1.85)	-9.03 (27.01)	-.30 (1.24)	.58 (.89)	4.87 (2.36)

Note. SES and CV are standardized variables

(0–3) which were significantly skewed towards the low end of the scale (80% of values less than 2). Log transformation of the decision-making variable improved model convergence, but led to a model indicating a very slight but statistically significant increase in decision-making over collaborative age ( $b = .01, p < .05$ ) but non-significant variability in the intercept and slope for this model. Therefore, analysis of the decision-making index was not pursued further. For the other two systems change indices, predictors of between collaborative variations in intercepts were then entered as separate blocks, with the community context variables entered first, followed by the five collaborative characteristics. Table 3 below presents the results for the base model (A), the community context time-invariant covariate model (B), and the collaborative characteristics time-varying predictor model (C), for both outcomes. All predictors are standardized so parameters in the table are standardized coefficients.

Results from the base model indicate that both systems change indices increased reliably as collaboratives aged, and there was significant between-collaborative variability in the level of each systems change index. The value of the intercept indicates that during its first year of existence, the average collaborative engaged in approximately 3 of the 14 indicators comprising the collaborative service delivery scale. As CCs age, this level increased by approximately .20 collaborative service delivery indicators per year. Although none of the predictor models had better fit than their respective base models, the time-varying predictors, tenure of chair and activity level, were significantly related to the level of collaborative service delivery, after controlling for community context. Activity level was also significantly related to financing levels. Because the slope of the age effect is fixed across collaboratives, these effects can be interpreted as the effect of the predictor on the *level* of the estimated age effect throughout the age-span, when the values of the other predictors are held constant. CCs with higher activity levels (and more tenured chairs) had higher levels of the collaborative service delivery systems change index, and this effect was constant across the age span. CCs with higher activity levels also had higher levels of the financing systems change index across the age span. To explicate the effects on collaborative service delivery for example, in any given year the level of collaborative service delivery increased approximately .30 indicators (remember that the systems changes variables are counts of multiple indicators of each construct) per standard unit increase in tenure of collaborative chair, and .39 per standard unit increase in collaborative activity level. Because these are time-varying predictors, they represent the increment in the outcome associated with each predictor, above and beyond the increase associated with age. Essentially, counties with more tenured chairs, and a higher



**Fig. 2** Longitudinal change in collaborative service delivery index

activity level engaged in more collaborative service delivery systems change, no matter what their age. Higher collaborative activity ratings were also associated with higher levels of the finance systems change index, above and beyond the effect of age.

Because they are time-varying predictors, the effect size of these predictors can be estimated by calculating the proportion reduction in the within-collaborative (Level I) residual term for each systems change outcome. The addition of the block of collaborative characteristics predictors explained a modest 3% of the within-collaborative residual in the collaborative service delivery model and 1% of the Level I residual for financing (Model A → C; Table 3).

System change as a predictor of programs delivered to children and families

In the second part of the analyses, the three systems change indices were treated as predictors of an intermediate outcome—the number of different types of programs and activities offered by each collaborative (program array). Means and standard deviations for program array across the age range are shown in Table 2. Similar to the systems change indices, the values for the program array variable appear to climb from the time of collaborative initiation to a peak around age 4, and then fluctuate up and down in later years. This dynamic is shown in Fig. 3 below, displaying program array trajectories for the same random sample of 10 collaboratives.

The pattern of longitudinal change in program array is more clearly evident in Fig. 3, which shows consistent increases in program array during the early years of collaborative age, but some declining trajectories among older collaboratives, which suggests decelerating growth with increasing age. Therefore, longitudinal change in program array was modeled as a linear function of age and a second curvilinear age function  $[-(\text{age}^2)$  to represent a decreasing growth rate] in the base model, and predicted by the three systems change indices controlling for community context in subsequent models. The model with random effects for the intercept and both slope parameters did not converge, and based on the covariance estimates, only the random effect for the intercept was retained. Accordingly, time-varying systems change predictors were entered into the Level I model to explain significant between-collaborative variability in the level of program array. Results from the base model with age as the sole predictor (Model A), a second model with the time-invariant community context variables as Level II predictors (Model B), and a final model (Model C) featuring the addition of the three systems change indices as time-varying predictors to the Level I model, are reported in Table 4 below.

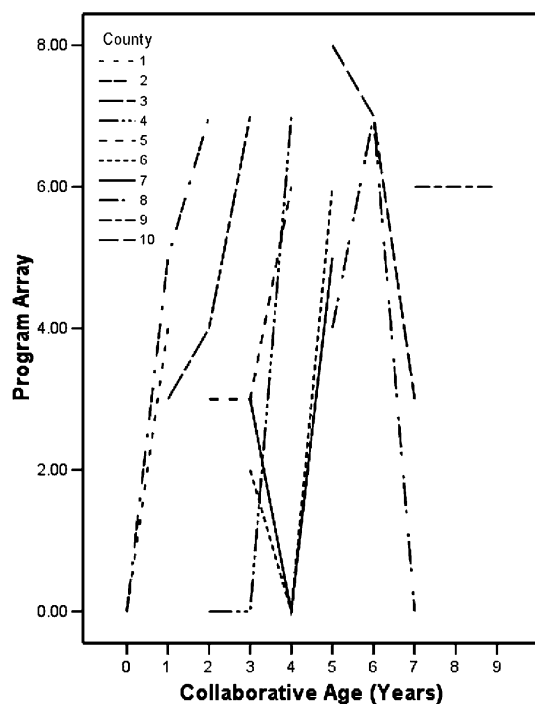
The linear effect of age is the instantaneous rate of change of program array at the intercept (Age 0), and the exponential effect indicates the amount that the linear effect of age is reduced per year of collaborative age. Results from Model C indicate that in the first year of collaboration, the average county had a program array value of .66, indicating engagement in less than one of a possible eight different types of programs and activities. This initial level increased by 1.5 programs and activities a year of collaborative age, from Year 0 to Year 1, but as indicated by the curvilinear age effect, this growth rate declined by .13 slope units per year. There was significant variability between collaboratives in the intercept. Model B which included time-invariant community context predictors of the linear growth parameter fit slightly less well than Model A, but included a significant effect of community vibrancy. This effect indicates that CCs with one standard unit higher community vibrancy had .18 fewer types of programs in the year of collaborative formation. This effect explained approximately 3% of the between-collaborative variability in the program array intercept. Results of Model C indicate that of the three systems change indices, only collaborative service delivery was significantly related to program array. As a time-varying predictor the effect of collaborative service delivery can be interpreted as an increase of .35 new program types in any given year, per standard unit increase in collaborative service delivery. This increment in program array controls for both the linear growth associated with age, and the nonlinear decline in age-related growth. The addition of this time-varying collaborative

**Table 3** Mixed models analysis of collaborative service delivery and financing ( $n = 418$ )

Models	Collaborative service delivery			Financing		
	A	B	C	A	B	C
# of parameters	4	6	11	4	6	11
Level I predictors (time-varying)						
Intercept	2.71*	2.76*	2.78*	.53*	.56*	.62*
Age	.20*	.18*	.18*	.09*	.09*	.07*
Tenure of chair			.30*			.06
Activity level			.39*			.13*
Sectoral representation			-.01			.07
Member involvement			-.02			-.05
Formality of structure			-.10			.05
Level II predictors (time-invariant)						
SES '00		.00	.01		.00	.00
Community vibrancy '00		.09	.12		.05	.06 <sup>†</sup>
Variance components						
Level I: Within-CC	5.88*	5.89*	5.71*	.95*	.95*	.94*
Level II: Intercept	1.29*	1.28*	1.29*	.24*	.23*	.22*
Goodness-of-fit						
Deviance (-2LL)	2001.54	2008.31	2003.03	1248.19	1256.50	1264.04
AIC	2005.54	2012.31	2007.03	1252.19	1260.50	1268.04
BIC	2013.60	2020.36	2015.05	1260.24	1268.55	1276.06

\*  $p < .05$ , <sup>†</sup>  $p < .09$

Note. Coefficients for tenure, activity, sector, involvement, formality, SES, and vibrancy are standardized



**Fig. 3** Longitudinal change in program array

service delivery predictor resulted in a 4% reduction of the Level I residual. The information criteria indicate a slight improvement in model fit from Model B to C with the addition of the systems change predictor. In sum these results indicate that collaboratives engaging in higher levels of collaborative service delivery systems change had greater variety in types of programs offered, above and beyond the typical growth in program array associated with age as well as the decline in the growth rate at later ages.

## Discussion

The potential to change systems is one of several theoretical advantages to the creation and implementation of comprehensive community initiatives, including community collaboratives and coalitions. However, the proliferation of these community collaboratives has not been matched with a proportional growth in empirical findings documenting their processes and outcomes. This study investigated some of the conditions under which collaboratives may be likely to institute systems changes, as well as the outcomes from these system changes.

Consistent with the theory of change of the Family Connection Partnership, collaboratives engaged in more

**Table 4** Mixed models analysis of program array ( $n = 417$ )

Models	A	B	C
# of parameters	5	7	10
Level I predictors (Time-varying)			
Intercept	.65*	.56*	.66*
Age	1.45 *	1.47*	1.49*
-(Age <sup>2</sup> )	.12*	.12*	.13*
Decision-making			.11
Collaborative service delivery			.35*
Finance			.02
Level II predictors (Time-invariant)			
SES '00		-.01	-.00
Community vibrancy '00		-.18*	-.20*
Variance components			
Level I: Within-CC	3.05*	3.64*	2.93*
Level II: Intercepts	2.79*	2.71*	2.67*
Goodness-of-fit			
Deviance (-2LL)	2045.77	2047.23	2038.87
AIC	2049.77	2051.23	2042.87
BIC	2058.03	2059.49	2051.11

\*  $p < .05$ 

Note. Coefficients for collaborative service delivery, SES, and community vibrancy are standardized

systems change as they matured. The most substantial increase in systems changes occurred in the first years of a collaborative's life. This again would seem to be consistent with expected development. As collaborative members get to know each other and the components of the overall service systems they represent, the potential for collaborative systemic change first gets acknowledged, then planned, then implemented. As with most developmental and behavioral changes, the amount of change begins to level off as the most obvious or achievable changes have been realized. Also, the trajectories of change seem to diverge among collaboratives after a few years, indicating that some of the collaboratives (perhaps the most ambitious, integrated, or needy) continue this growth in systems change over time while others do not.

The analyses showed that in addition to age of the collaborative, there were other characteristics of the collaborative that predicted the degree of systems change implemented. The general activity level of the collaborative predicted changes in financing and in collaborative service delivery. That is, collaboratives that were more active and vibrant, probably meeting more often, were more likely to engage in these kinds of systems changes. This would be predicted by the collaborative theory of change; as collaboratives get active, they will engage in the kinds of systems change they were designed to affect. Similarly, the tenure of the chair also predicted changes in

collaborative service delivery, indicating that as chairs stayed in office longer, they were able to facilitate more collaboration around service delivery (e.g., a common intake form across organizations) and more accessible (e.g., neighborhood-based, culturally competent) services for children and families.

It is important to note that these collaborative characteristics predicted systems change above and beyond the effects of the age of the collaborative itself. That is, we would expect that older collaboratives would have chairs with more tenure and would increase their activity levels (at least in the first few years) that might coincide with increases in systems change. However, even controlling for these dynamics, these other characteristics were significantly related to the increases in systems changes, though this increased predictive power was admittedly modest.

As collaboratives develop through their first few years of existence, they increased the number of types of programs that they implement or facilitate, followed by a period of decline in later ages. This pattern, similar to the pattern of systems change, is to be expected. Our multilevel analyses indicated variability in the level of program array. Part of this variability was explained by adding one element of systems change (collaborative service delivery) to the model, indicating that collaboratives who engaged in greater levels of this form of systems change had a greater number of types of programs implemented or facilitated. This finding suggests that it is possible to do more and do it better (more comprehensive, accessible, and collaborative) simultaneously. In other words, increases in collaborative service delivery are associated with increases in the types of services offered.

Although these findings are of interest, it is important to note that the rating of systems change is based on self-report. Collaboratives are instructed to complete the Self-Assessment Survey collaboratively, but in most cases the responses represent only a few perspectives. In any case, the report of systems changes may reflect some degree of social desirability, in that collaboratives were most likely aware that systems change was a desirable intermediate outcome for collaboratives. However, this message was not overbearing, nor were there consequences for not engaging in systems change, nor is there any reason to expect that the social desirability of this response would have increased over time, as did the ratings of systems change. Furthermore, independent observations of a sample of six collaboratives chosen for case study indicated that at least this small sample of collaboratives were truly engaged in such changes (Metis Associates and EMSTAR Research, 2003).

It should also be noted that both the predictors and outcomes of systems change were at times statistically significant but offered minimal explanatory power. Al-

though significant predictors of levels of systems change and program array were identified, these predictors explained a small portion of the within- and between-collaborative variability in outcome levels. It is unclear what portion of within- and between-county residuals are due to measurement error—the scale of the data-gathering task for this study and more specifically the fact that respondents vary between collaboratives and also in some cases within collaboratives over time suggest that measurement error in this study may be particularly large. Nevertheless the low percentages of variance explained indicate that the base models used to describe average change in the outcomes, and the models of between-collaborative variability in intercept and slope parameters from the base models, are to some extent inadequate representations of the change that is happening in the data. Although multilevel modeling is a relatively sophisticated analytic technique and is appropriate for this particular data structure, the particular models applied here are relatively simplistic in the class of multilevel models. Our ability to detect associations as hypothesized with these relatively simplistic models suggests the promise for further development of base models describing the nature of longitudinal change in the outcomes, as well as more complete specification of predictor models of longitudinal change in outcomes.

Despite the concerns raised above, there is some confirmation and validation of the theory of change which states that when representatives of various service systems come together in a collaborative setting, that they can implement changes in the systems they represent. Furthermore, these changes make a difference in the services available to the children and families in these communities.

While our findings were largely consistent with our theory, some results either failed to confirm the theory and/or were inconsistent with other research. For instance, Hays et al., found that member diversity, sectoral representation, member participation were significant predictors of systems change, while we did not. In fact, previous unpublished research on the Family Connection collaboratives (Erickson, 1999) indicated that those with smaller numbers of active participants were in some ways more functional. This points out the possible discrepancy between the theoretical value of bringing diverse perspectives to the table, and the greater efficiencies that may exist when fewer individuals are involved in reaching consensus and taking action. This discrepancy is a challenge to both the practice and study of community collaboration.

Many other challenges remain for those engaged in research on community collaboratives, some of which were evident in the present study. The processes and outcomes of these entities are many and complex, with a

daunting number of variables within the community context and the collaborative characteristics which could predict their ability to change systems. It would be useful to measure collaborative processes from multiple perspectives (e.g., staff, members, outsiders). Additionally, while this study used systems change to identify the range of program types implemented, it would be even more valuable to identify the exact nature of the types of programs and services implemented by collaboratives engaged in systems change. Of ultimate value is the question of the degree to which these processes, activities, and systems changes affect the health of those who live in these communities.

## Appendix

### Systems change indices

#### *Decision-making*

1) Community involvement: forums, town meetings, focus groups, task forces, councils etc.

2) Computer/information network linking 2 or more organizations

3) Cross-county/regional collaboration

#### *Financing*

1) Blended funding

2) Redirection of existing funds

3) Implementation of at-risk targeted case management

4) Implementation of DFCS/Family Connection USDA Nutrition Education Cash Match

5) Other changes in financing and budgeting

#### *Collaborative and accessible service delivery*

1) Common forms (intake, etc.) and/or cross-organizational rules (policies, etc.)

2) Redeployed or co-located staff

3) Coordinated interagency case management

4) Volunteer development: recruitment, training, and placement

5) Transportation development: shared vehicles, routing etc.

6) Improving availability & accessibility of services

7) Taking promising practices to scale

8) Preventive approaches: home visitation, early learning, youth development, etc.

9) Neighborhood-based, family friendly approaches: family resource center, neighborhood based support network, etc.

10) Culturally competent and responsive practices

11) Identifying policy barriers to effective service delivery

12) Leadership development seminars/workshops

13) Self-help network

14) Other changes in the collaborative service delivery

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