**Enhancing Adolescent Self-Efficacy and Collective Efficacy through Public Engagement around HIV/AIDS Competence: A Multilevel, Cluster Randomized-Controlled Trial**


## ABSTRACT

The potential capacity of children to confront the HIV/AIDS pandemic is rarely considered. Interventions to address the impact of the pandemic on children and adolescents commonly target only their vulnerabilities. We evaluated the Young Citizens Program, an adolescent-centered health promotion curriculum designed to increase self- and collective efficacy through public education and community mobilization across a municipality in the Kilimanjaro Region of Tanzania. The theoretical framework for the program integrates aspects of human capability, communicative action, social ecology and social cognition. The design consists of a cluster randomized-controlled trial (CRCT). Fifteen pairs of matched geopolitically defined neighborhoods of roughly 2000-4000 residents were randomly allocated to treatment and control arms. Within each neighborhood cluster, 24 randomly selected adolescents, ages 9-14, deliberated on topics of social ecology, citizenship, community health and HIV/AIDS competence. Building on their acquired understanding and confidence, they dramatized the scientific basis and social context of HIV infection, testing and treatment in their communities over a 28-week period. The curriculum comprised 5 modules: Group Formation, Understanding our Community, Health and our Community, Making Assessments and Taking Action in our Community and Inter-Acting in our Community. Adolescent participants and adult residents representative of their neighborhoods were surveyed before and after the intervention; data were analyzed using multilevel modeling. In treatment neighborhoods, adolescents increased their deliberative (*CI= 0.44-1.56)* and communicative *(CI*=0.6-1.77) efficacy and adults showed

higher collective efficacy for children *(CI=0.28-1.54).* Following the CRCT assessments, the control group received the same curriculum. In the Kilimanjaro Region, the Young Citizens Program is becoming recognized as a structural, health promotion approach through which adolescent self-efficacy and child collective efficacy are generated in the context of civil society and local government.

**Introduction**

Interventions to address the impact of the Human Immune Virus/Acquired Immune Deficiency Syndrome (HIV/AIDS) pandemic on children and adolescents commonly target their vulnerabilities, such as their orphan status. The potential capacity of children to confront the epidemic is rarely considered (Earls et al., 2008). Given the availability of HIV testing, counseling and antiretroviral treatment for all ages, circumstances exist for children and adolescents to contribute through civic engagement to HIV/AIDS competence around prevention, testing and treatment (AIDS Competence Programme, 2005). The Young Citizens Program (the YC Program) established in Moshi in 2003, a midsized municipality in the Kilimanjaro Region of Tanzania, adopts a health promotion framework (WHO, 1986) to foster critical, intergenerational public discourse about HIV/AIDS (Earls & Carlson, 2001). In this paper, the YC Program is evaluated by a cluster randomized-controlled trial (CRCT) in which the science and social context of HIV/AIDS become topics of public deliberation and social action within geopolitically defined neighborhoods. These preexisting neighborhood units are referred to as *mitaa,* plural, and *mtaa,* singular, in KiSwahili. The rationale for the cluster design is to treat these *mitaa* as units of analysis as part of a structural intervention, using multilevel modeling. The term, neighborhood, will be used when referring conceptually to these units while

the terms, *mtaa* and *mitaa*, will be adopted when referring specifically to them. Reporting of this trial follows the CONSORT Working Group guidelines (Campbell et al., 2004).

The YC Program originated in the Project on Human Development in Chicago Neighborhoods, a multilevel, longitudinal study that documented the important role of collective efficacy as a neighborhood-level protective mechanism for health and well-being (Sampson et al., 1997). Defined as the combination of social cohesion and the willingness to take civic action, the health benefits of collective efficacy have been shown to impact violence (Molnar et al., 2003; Sampson et al., 2005); asthma (Cagney & Browning, 2004; Sternthal et al., 2010), birth weight (Buka et al., 2003); mental health (Xue et al., 2005) the age of onset of sexual intercourse (Browning et al., 2005) and mortality (Lochner et al., 2003). The encouraging results of this observational study challenged us to design an experimental intervention to enable young adolescents to strengthen collective efficacy in their local neighborhoods (Earls & Carlson, 2002). To achieve this, the YC Program established its feasibility, safety and acceptability within a framework grounded in theory and empirical research necessary to guide implementation and multilevel outcome measurement (Chan et al., 2003; Carlson & Earls, 2011a).

Several social and behavioral science theories are foundational to the YC Program. The capability theory of Sen provides the critical concepts of human agency at the individual level and of social choice in the context of local opportunity structures as the basis for remedying human inequality (Sen, 1992; 1999). The communicative action theory of Habermas stresses the use of reason, perspective taking and deliberative communication to achieve mutual understanding in the public sphere (Habermas, 1984; 1987). He emphasizes rational argumentation to achieve shared social action, in contrast to strategic or instrumental approaches.

Through the participatory drama method of Boal (1979), adolescents are able to portray the biological complexity of HIV infection and confront the social stigma surrounding AIDS through critical engagement with public audiences (Kamo et al., 2010). The multilevel design was informed by the ecological theory of Bronfenbrenner (1979) in which reciprocal interaction between children and their social environment forms the crux of human development (Bronfenbrenner & Ceci, 1994). According to Bandura's theory of self- and collective efficacy (Bandura, 2000; Sampson et al., 1999), the attainment of perceived personal and collective competence in the face of specific environmental challenges determines well-being (Earls & Carlson, 2001). These constructs informed the outcome measures of the YC Program. In combination, these theories provide a developmental framework to explore how enhanced personal knowledge and control transfer to the larger social context in which the maturing child is embedded. A detailed curriculum was devised to achieve these intersecting aims (Carlson & Earls, 2011b).

The objectives were to increase the competence of youth participants in the YC Program and to evaluate their impact at the neighborhood level. Adolescents' positive mental health, as reflected in the motivation and skills required to be effective HIV health agents, was evaluated by structured interviews in pre- and post-treatment assessments. The hypotheses are that the YC Program enhances: 1) adolescents' confidence to deliberate on the biological and social issues related to the prevention, testing and treatment of HIV infection with residents of all ages and 2) the recognition by adult residents of adolescents' capabilities as health agents to promote collective efficacy and HIV/AIDS competence.

**Methods**

*Study setting*

The eligible population for program participants consisted of all children between the ages of 9 and 14 living in households in the Moshi Urban District in the Kilimanjaro Region of northern Tanzania. The eligible clusters were the 60 residential *mitaa* with a total population of 144,739 in the 2002 census (Census of Tanzania, 2002). HIV seroprevalence was 10.4 percent at the beginning of the study period in 2003 (Kapiga et al., 2006). The *mitaa* were composed of 2000-4000 residents and administered by democratically elected leaders, known as chairpersons, key members in the decentralized government structure (United Republic of Tanzania, 1998). The 60 residential *mitaa* in the district represented the eligible clusters for the treatment and control arms of the CRCT.

*Human studies*

The Human Studies Committee at Harvard Medical School reviewed the study. In Tanzania, the study was reviewed locally by the Ethical Clearance Committee of the Kilimanjaro Christian Medical College and nationally by the National Institute of Medical Research. The research project was also registered with the Tanzanian Commission on Science and Technology. A Data Safety and Monitoring Board visited the Young Citizens Program regularly to assess the progress of the trial and to monitor the occurrence of any adverse events.

*The Young Citizens (YC) Program: an individual- and neighborhood-level intervention*

The YC Program curriculum was organized into theme-specific modules and implemented in local primary schools and public spaces. Increasing emphasis was placed on the participation and decision making of the adolescents over a 28-week course. Modules consisted of weekly sessions of 2-3 hours, implemented by 3-member teams of young adult facilitators either after-school or on weekends. The teams included university and secondary school graduates with previous experience in youth-related HIV activities. They were trained on the theoretical and scientific principles of the curriculum and the research design and practiced the participatory activities of the curriculum for a 2-week period.

Each YC Program session was organized around one or more themes and related activities, described in a detailed script for each of the 5 modules and 29 sessions overall. Each session script was introduced by a standard agenda containing: review of previous session, introduction to current agenda and objectives, cooperative roles, activities, snack break, reflections, and preview of objectives of the subsequent session. The development of sessions was a collaborative effort between the investigators and supervisory staff based on the theory that guided the YC Program (Carlson & Earls, 2011a) and the evaluation of reports from the previous week's session (Carlson & Earls, 2011b). Quality control was achieved by careful selection, training and supervision of team members, along with standardized, detailed reports of all sessions and team meetings. Quality assurance was achieved through weekly monitoring by trained, independent observers. They recorded fidelity to session scripts during classroom-based sessions using a checklist that specified adherence to the script, the sequencing and timing of themes and activities and indications of age or gender bias in implementation.

Module 1 (5 sessions) introduced the methods by which adolescents were selected to be representative of their *mtaa* within the research design. With a focus on group formation and deliberative citizenship, activities included encouraging an egalitarian group structure, building trust, taking perspectives of others and using explicit communication and reasoned discourse. Module 2 (4 sessions) introduced child rights, cooperative learning, and citizenship. Activities facilitated the acquisition of observational skills, social mapping, interview techniques and participatory drama. In Module 3 (5 sessions), adolescents used participatory drama to portray the "microworld" of the immune system in defending the body and its collapse following HIV infection (Kamo et al., 2008). They developed the thematic skits of the "macroworld" through deliberation on HIV stigma, transmission, prevention, testing and treatment for AIDS. Module 1 sessions were held in classrooms in the local primary school and Modules 2 and 3 sessions were held both in classrooms and nearby public settings in the *mtaa*.

Beginning in Module 4 (8 sessions), the adolescents designed, conducted and analyzed mini-surveys to evaluate audience expectation as to their potential for education and social change prior to their first public engagements. Over the following sessions, groups participated in a deliberative ranking process on topics emerging from their surveys and public engagements, unanimously choosing stigma as the primary challenge to achieving HIV competence. In the first 6 weeks of Module 5, 2-hour sessions consisted of rehearsals and performances of microworld and macroworld skits that encouraged audience participation and critical exchanges around issues raised in their performances. The facilitative role of the *mtaa* chairpersons was manifested by their presence at community sessions and in the depiction of their role in resolving family and community predicaments in macroworld skits. In the final session of Module 5, the adolescents administered a follow-up survey following their 6 weeks of public engagement. These

adolescent-administered surveys were an exercise in self-evaluation and independent of the post-treatment community survey.

*Pre- and post-treatment assessment at the individual and neighborhood levels*

At the individual level, the adolescents and their primary caregiver were assessed independently using parallel, structured interviews. The pre-and post-treatment health assessments of adolescents were done in centrally located school settings. These assessments included sections on growth, pubertal development, sexuality, schooling, family relations, worries, mental health and self-efficacy. Data from the caregiver assessment are not reported here and have not been published elsewhere.

At the neighborhood level, collective efficacy was measured in two independent, cross-sectional and representative community samples of adult residents, pre- and post-treatment. The pre-treatment community survey was conducted to address two objectives. The first objective was to delineate a subset of demographic variables for matching neighborhood clusters prior to randomization. The second objective was to measure pertinent neighborhood characteristics in a representative, cross-sectional sample of adult residents prior to allocation to the treatment and control arms. The interview used a structured instrument containing close-ended items with sections on demographics, household material conditions, personal well-being, HIV/AIDS knowledge and attitudes and collective efficacy. Interviews of adult residents. The post-treatment community survey replicated the structure and content of the pre-treatment survey. Consistent with the second objective, the post-treatment survey was limited to the 30 treatment and control *mitaa*.

The post-treatment community survey was administered within 2 months, and the post-treatment health assessment within 4 months, following the completion of the intervention. For both surveys, teams of local assessors were trained to reach and maintain a satisfactory level (70%) of inter-rater reliability with field supervisors. Several strategies were used to mask assessors, including: 1) hiring assessors not familiar with the treatment; 2) ensuring that assessors were not aware of the allocation to treatment and control *mitaa*; and 3) conducting the health assessments in central locations where treatment and control participants were indistinguishably mixed.

*Measures*

At the individual level, 5 self-efficacy Likert scales were created, based on expert content analysis supported by exploratory factor analysis. These were formatted as 3-point Likert scales of agreement. The deliberative and communicative efficacy scales were enhanced between pre- and post-treatment health assessments with the addition of 5 items, by 1 and 4 new items respectively. Three neighborhood-level scales were derived: a 4-item scale of adult perceptions of the efficacy of young adolescents as it relates to HIV health promotion (child collective efficacy) for the post-treatment survey only; a 6-item scale of neighborhood collective efficacy; and a 5-item scale of neighborhood problems. Without deleting any of the original items, the 6 neighborhood collective efficacy items were revised for the post-treatment survey from a yes/no format to a 4-point Likert scale of agreement. Table 1 footnotes indicate items added or revised in the post-treatment assessment scales along with the Likert scales used. The individual items were developed in English, translated to KiSwahili and back translated by Tanzanian native-

speakers using a team approach and pre-tested. Item composition and reliability of the self- and collective-efficacy scales are shown in Table 1.

*Sampling plan*

The two-stage sampling plan is illustrated in Figure 1. In the pre-treatment stage a probability sample of adults in the 60 residential *mitaa* was recruited to participate in the baseline survey prior to selecting and allocating matched pairs of 30 *mitaa* to treatment and control arms. *Mitaa* consisted of 2 to 12 primary sampling areas (PSAs), which are used for census purposes and are composed of roughly 400 residents each. 144 of the 335 PSAs representing the 60 *mitaa* were randomly selected proportional to the size of a *mtaa* and 16 heads of household (or proxies) in each of the PSAs were sampled.

A statistical power analysis was undertaken with the goal of achieving adequate power at small to moderate effect sizes for a sample of 30 *mitaa*. Because the data analysis needs to account for the clustering of subjects within the *mitaa*, multilevel modeling was used (Goldstein et al., 2002); therefore, the proportion of variance at the cluster *(mtaa)* level, the intraclass correlation (ICC), the measure of how much variation is due to clustering, must be taken into account in the power calculations. Although the ICC was an unknown, the number of clusters and subjects per cluster as well as a desirable effect size could be adjusted in the power calculations. In order to explore this, Optimal Design software, used to power CRCTs (Liu et al., 2009), was used to plot power against ICC for three effect sizes, two generally considered small to modest, 0.2 and 0.3, and a medium effect of 0.5. ICCs ranging from 0 to 0.6 were used based on the distribution of similar measures from the Project on Human Development in Chicago Neighborhoods. For the

medium effect size, 0.5, there is high power across the entire range with power at the ICC of 0.1 being 0.95. For a small to modest effect size of 0.3, power for an ICC of 0.02 was 0.90, at an ICC of 0.4 the power was 0.80, at an ICC of 0.6 the power was 0.72, beyond that the power was lower than desired. For the small effect size of 0.2 the power at an ICC of 0.1 was 0.65.

The initial step in the random allocation of *mitaa* was a cluster analysis informed by baseline demographic and population data: adult levels of education, employment, residential stability, sanitation, electricity, area and population density and average number of adults and children per household. These variables were important in generating matched pairs based on their relevance to child development outcomes and their variability across *mitaa*. The *mtaa* pairs were selected from the outcome of the cluster analysis, eliminating *mitaa* linked in groups larger than 2. This eliminated the need for a more complex decision rule for trios and larger groups and it helped increase the representation of the diversity of *mitaa.*

To address concern for spatial diffusion of the treatment effect to control *mitaa*, a non-adjacency/physical boundary rule was invoked in the random allocation process. Geographic Information System (GIS) maps of Moshi Urban District, indicating building structures and geopolitical and physical boundaries, such as highways, train tracks, rivers, or other physical barriers were used in conjunction with a randomly ordered list of the matched *mtaa* pairs. As each pair was randomly assigned by a coin flip, the spatial configuration of treatment and control *mitaa* was checked and the non-adjacency boundary rule applied. If the conditions of this rule were not met, the randomization was restarted until the first 8 pairs were successfully completed. Using this rule, allocation proceeded to assign each matched pair to treatment or control arms until the remaining 7 pairs were successfully assigned while maintaining the same rule.

The research team used the same GIS maps to enroll 24 adolescent participants from households in each of the 30 paired *mitaa*. The process began by fitting a 24-quadrant grid on an *mtaa* map to choose one residential building in the center of each quadrant. In the field, assessors located this dwelling and asked the respondent of resident households if a child in the designated age range lived there. If not, they systematically sampled dwellings by circling in an increasing radius around the index house until a household until an eligible child was found. One child per household, the youngest in the age range, was recruited. The assessor would then move to the next quadrant and repeat the same process. In the final stage of sampling attention was given to achieving gender balance within the groups.

*Analytic overview*

These data have a structured hierarchy of participants within neighborhoods. While the treatment is administered at the neighborhood level through the actions of participants, outcome measures are assessed at the level of individual participants in the YC Program and individuals in the post-treatment community survey who represent the adult population of *mitaa*.

In order to accommodate the clustering of subjects in neighborhoods, a sequence of hierarchical linear/nonlinear models (HLM), also known as multilevel models (MLM) was tested to determine whether significant variation in individual- and neighborhood-level outcomes existed across neighborhoods (Goldstein et al., 2002). All statistical tests presented in this paper were obtained using HLM/MLM in order to account for the effect of clustering. Unconditional models containing only pre-treatment community survey and health assessment outcome variables were

first tested. The null model partitions the variance into within- and between-units. The between-neighborhood component was tested, and if significant, indicated that it was not constant across neighborhood. The effect of the treatment on the neighborhood was assessed by individually administered surveys, and this analysis followed the same structure and logic as individual-level models.

The second sequence of HLM models adds the treatment variable at the neighborhood level. If no differences are found prior to the intervention between treatment and control *mitaa,* this confirms that the random allocation procedures equalized pre-treatment differences. Pre-test scores and a preselected set of covariates were retained in all analyses as a further control and to increase the precision of the treatment effect estimates by removing error variance related to the covariates (Austin et al., 2010). This ANCOVA-like approach avoids the reliability problems associated with the use of change scores (Willett, 1989).

**Results**

*Pre- and post-treatment dates and response rates*

The response rate for pre-treatment community survey was 95% yielding a sample of 2205 from 2320 households across 60 *mitaa* (January-March, 2004). In the post-treatment community survey, conducted in the 30 treatment and control *mitaa*, 1119 adult residents were interviewed, representing a response rate of 96.8% (September- November, 2005).

In recruiting adolescent participants for the YC Program across the 30 *mitaa*, 2656 households were screened, yielding 827 (31.1%) age-eligible children of which 95 (10.6%) refused and 5 families could not be relocated. Prior to random allocation, a pre-treatment health assessment was completed with 724 adolescents and their caregivers (August-November, 2004). In the post-treatment health assessment, 617 adolescents (85.2 %) were re-interviewed (January-April, 2006) and 613 were used in the analysis. Families moving out of the municipality and adolescents attending boarding schools were the most common reasons for attrition from the study (see Figure 1). All YCs were re-contacted for the post-treatment health assessment regardless of their level of participation in the YC Program.

The allocation strategy and comparison of neighborhood characteristics anticipated that differences might exist between *mitaa* in their pre-existing characteristics. Using results from the 30 treatment and control *mitaa*, 29 covariates from the pre-treatment community survey were compared. Twenty-four variables represent the proportion of individuals in the *mtaa* with a certain trait and 5 continuous variables (area and population density, numbers of adults and children per household, and years of residence in the *mtaa*) represent means across neighborhoods. Hierarchical linear and non-linear (Bernoulli) models were used to test for differences between the treatment and control *mitaa*. As shown in Table 2, no significant differences were found on demographic and household proportional variables. Nor were there differences in the continuous variables measured, including number of adults and children per household (mean= 2.48, sd=1.22, $p$= 0.42; mean=1.93, sd=1.48, $p$= 0.27 respectively) or years of residence in the mtaa ($p$= 0.34). No differences were found in area or population density *(p*=

0.20, $p$= 0.39). These analyses indicate that the similarity of treatment and control *mitaa* is acceptable.

*Implementation of the YC Program treatment*

Three lines of evidence judged the success of YC Program implementation: safety, acceptance by parents and community members and the level of attendance of adolescent participants. Based on the direct observation of sessions, the absence of reported adverse events and evaluations by parents and community leaders, the Data Safety and Monitoring Board determined that the intervention was safe and acceptable. Acceptability was established in group meetings that gave parents an opportunity to critically appraise the program. Frequent and sustained interaction with the program by community leaders during modules 2, 4 and 5, generated a high level of enthusiasm and cooperativeness. At the end of the intervention period, the YCs conducted a seminar for the full Moshi Municipal Council that resulted in a formal endorsement of the program. Based on these multiple sources of evidence the decision was made to extend the intervention to the 15 control *mitaa*.

The overall level of attendance was 70% across the 5 Modules and 15 treatment *mitaa*, varying from 54 to 84% across Modules 1 to 5. Attendance increased from Module 1 to Module 3 and declined slightly in Module 4. A more marked decline occurred in Module 5 in part due to the increased time demands of multiple community sessions. Other reasons for non-attendance across all modules included scheduling conflicts with tutoring and religious instruction and changes in residency and/or schools. Quality assurance revealed a high level of fidelity to the curriculum and no age or gender differences in implementation.

Community engagement activities were scripted for 6 of 7 sessions in Module 5 and often held twice weekly in the most populous *mitaa*, for an average of 8.8 community sessions over all *mitaa.* The microworld and macroworld skits were held at frequented areas such as road intersections, markets, and bus stops. The skits along with public discussion typically lasted beyond one hour. Facilitators recorded the audience size for each of the 132 community sessions, which ranged on average from 15 to 89 persons across the 15 *mitaa* and an overall average of 64 persons per session.

*Impact of treatment at the individual level*

Table 3 displays the post-treatment descriptive statistics and intra-class correlations for individual and neighborhood level outcome scales. As shown in Table 4, post-treatment scores on deliberative self-efficacy (confidence interval, *CI= 0.44-1.56)*, communicative self-efficacy *(CI=0.6-1.77)* and emotional control (*CI=0.05-0.77*) were significantly higher in the treatment group than in the control group. Effect sizes for the individual outcomes were computed from the regression coefficient for treatment to account for all other effects in the model. The effect sizes for treatment coefficients (Table 4) fell between the usual definitions of small *(d*=0.17) to small to medium *(d*=0.27 & *d*=0.30) for deliberative and communicative scales respectively. Treatment adolescents did not differ significantly from control adolescents on measures of academic efficacy or peer resistance. As anticipated, the ICC values for these individual outcomes were very small. The models contained covariates for pretest scores on measures of the corresponding outcomes as well as child age, gender, household wealth, and whether one or both parents were deceased. All models contained neighborhood-level covariates: population density, average years of residence in the *mtaa* and proportions completing primary school, secondary

school, and university, gainfully employed, owning a home, wealth and knowing the *mtaa* leader. The inclusion of these variables to the model prior to adding the treatment variable reduced the ICC levels to near 0 (Table 3).

*Impact of treatment at the neighborhood level*

HLM models for the three neighborhood-level outcomes were fit similarly to the models for the individual-level outcomes. In contrast, there were no adult resident-level covariates from pre-treatment community survey included in the neighborhood models as these were another cross-sectional sample. As measures of neighborhood constructs, the ICCs were greater than those for the individual-level constructs (Table 3). The same post-treatment neighborhood-level covariates used in the individual-level analyses were employed to adjust for any differences in neighborhood composition and to increase precision of treatment estimates. Table 5 shows that child collective efficacy was greater in the treatment *mitaa* as compared with the control *mitaa* (*CI=0.28 - 1.54*). Neither of the other outcomes, neighborhood collective efficacy or neighborhood problems, revealed any evidence of difference at post-intervention. The effect size calculated from the treatment regression coefficient for child collective efficacy was quite large (*d*= 1.36, Table 5). This could be viewed as an artifact of variance partitioning in a multilevel model, in which most of the variance is between individual adult respondents within neighborhoods not between the neighborhoods. This makes the effect size for the community-level effect observed at the individual level comparatively large. Given the size of the coefficient relative to the measurement scale, the effect can be considered similar to those observed for the individual outcomes.

## DISCUSSION

The YC Program was conceived as a structural intervention aimed at strengthening personal and collective efficacy to promote HIV/AIDS community competence (Carlson & Earls, 2011a). The participatory curriculum enabled young adolescents to acquire the scientific knowledge and the communicative and critical thinking skills needed engage in informed public deliberations around HIV/AIDS in their neighborhoods.

### *Individual-Level Outcomes: Self-efficacy*

Of the 5 defined domains of self-efficacy, 3 were greater in the treatment group as compared to the control group following the 28-week intervention. Young Citizens in the treatment group displayed enhanced deliberative and communicative self-efficacy. The scale items that captured these cognitive, language and social capacities were those targeted by the intervention. Throughout the sessions and community meetings, Young Citizens were encouraged to consider the perspective of others as they deliberated on relevant topics to reach shared decisions for community action. Progressing though the curriculum, adolescents became increasingly skilled in engaging the community and using drama to address topics not customarily discussed with adults. Thus, these results reflect the specificity of the measures to capture the essence of the intervention. Though the YC Program curriculum focused on social behavior and attitudes, emotional control was also enhanced in the treatment group indicating that an important aspect of personal mental health was positively affected. The program enabled building trust and sharing perspectives that could have benefited emotional expression and control.

There were no significant differences at post-test between the groups in academic self-efficacy or peer resistance. Nothing in the YC Program addressed conventional academic subjects, the focus of the academic efficacy scale. Interpretation of the nonsignificant finding for the peer resistance scale is more problematic. First of all, this is a truncated scale consisting of only two items, one related to substance use and the other to sexual behavior. Second, the fact that the deliberative self-efficacy scale contains several items related to peer relations might have undermined measurement of peer resistance. Third, from a social perspective, young adolescents in Tanzania may be under less peer pressure to engage in these illicit behaviors, given a later age of onset of sexual intercourse than in other societies (Kawai et al., 2008).

*Neighborhood-Level Outcomes: Collective-efficacy*

The findings at the neighborhood level were also linked to the content of the YC Program, especially Modules 4 and 5 when participants engaged residents of *mitaa* in public venues. Residence in a treatment *mtaa* was reflected in an enhancement of the belief that adolescents could contribute to a greater understanding and more open communication about HIV/AIDS in their communities. In a preliminary report not accounting for neighborhood of residence, there were significant attitudinal effects among adults who witnessed the community dramas presented by Young Citizens (Kamo et al., 2008). In the definitive analyses reported here, we demonstrate this enhancement to be a neighborhood effect not limited to adults who saw the dramas. We take this as stronger evidence that broader social norms and expectations were being influenced. Public discussion of HIV/AIDS in this region is generally discouraged, especially exchanges involving adolescents and adults (Wellings et al., 2006). Items affirmed on the child collective efficacy scale indicated that adolescents and adults could converse freely about HIV/AIDS and

that adolescents could help break the silence and stigma surrounding this topic.

The neighborhood collective efficacy scale was composed of items covering the supervision of children and reciprocal exchange between adult neighbors (Sampson et al., 1999). While over the long term we might expect the types of norms and expectations initiated by the YC Program to result in closer monitoring of adolescents and of protective actions towards them, this change in norms was not reflected in outcomes measured immediately after the intervention. The same may be the case for the neighborhood problems scale.

*Sustainability*

Consent to participate in this CRCT was based on an agreement to replicate the YC Program for the control group if the original treatment proved to be safe and beneficial. In the original treatment group, participant selected stigma and universal HIV testing as major topics for action. These priorities were maintained during the YC Program implementation in the control *mitaa* (now, second treatment group), with many of the original treatment group adolescents joining the second group in their community mobilization sessions. Although HIV testing facilities existed in the municipality, residents appealed to the participating adolescents during their performances to bring testing services directly to the community. In response, the original and second treatment groups joined to organize community HIV testing and counseling health fairs in conjunction with district health officials in 2007. These fairs proved highly successful in testing hundreds of residents a day, half of whom were men (Kamo et al., 2008). In 2008, new skits and fairs emphasized prevention-of-mother-to-child-transmission, resulting in over 1000 residents tested on weekends, 20% of them between infancy and age 14 (Carlson & Earls, 2011a). Of the

adults tested, 75% responded that their participation was prompted by the YC community mobilization. These actions provide external validation for the CRCT survey results regarding the impact of the program on the HIV/AIDS community competence. In 2011, the YC Program was officially established as a community-based organization. Former participants and facilitators, working together with district health, education and community development officials, continue to recruit, train and facilitate new groups of Young Citizens to address a variety of community health issues.

*Limitations*

An inherent limitation of survey data is that participants may report responses that are biased by social desirability. The fact that adolescents in the treatment group continued to engage in public engagement that conveyed deliberative and communicative competence and confidence beyond the end of the formal intervention period represents a form of validity to the gains reflected in their self-reports. Another threat to internal validity relates to the masking of interviewers to the treatment condition. The training, quality control and monitoring procedures minimized this source of bias. The possibility for diffusion of the treatment effects to control neighborhoods was reduced by the non-adjacency rule adopted for the random allocation of *mitaa*.

*Conclusions*

Tanzania represents a cohesive and peaceful society, given its national language, prominence of nationality over ethnicity and decentralized democratic structures. With an emphasis on citizenship skills, active participation and decision-making, the YC Program was operating in a

socially and politically favorable environment that permitted the expression of inherent capacities of adolescents for civic participation. Yet the limits on generalizability rest on the willingness of adults to be receptive to initiatives taken by adolescents (Onyango-Ouma et al., 2003; Morse, 2008). This is undoubtedly a reciprocal process in which the fostering the capability and confidence of young citizens is a major contributor.

As enshrined in the Ottawa Charter, the aspirations of health promotion are to strengthen community and personal capabilities to exercise control over prevailing health concerns (WHO, 1986). The treatment outcomes of this trial, at the individual and collective levels, represent the type of assets needed to achieve such control. Evidence of its treatment effectiveness along with the set of efficacy measures developed to capture these enhanced capabilities sets the stage for replication and expansion of the YC Program to other health and social conditions, as well as to other settings. In the context of large-scale public health problems such as the HIV/AIDS pandemic, small to medium effect sizes such as those reported here may carry important policy implications (McCartney & Rosenthal, 2000).

The longer-term goal is to engender structural change in which child and adolescent participation in HIV health promotion reduces stigma and promotes testing and treatment as key elements of HIV/AIDS community competence. The benefits to adolescents are seen both in their increased sense of efficacy as well as an increase in collective efficacy in their communities in the face of a serious health challenge. The community stands to benefit from the greater inclusiveness in the health competence it attains as well as from the vanguard of a new generation of informed, engaged citizens.

**References**

AIDS Competence Programme. (2005). Evaluation of the UNAIDS/UNITAR AIDS Competence Programme http://data.unaids.org/publications/irc-pub06/jc1144-acp.evaluation_en.pdf (accessed November 5, 2011)

Austin, P.C., Manca, A., Zwarenstein, M., Juurlink, D.N., & Stanbrook, M.B. (2010). A substantial and confusing variation exists in handling baseline covariates in randomized trials: a review of trials published in leading medical journals. *Journal of Clinical Epidemiology,* 63(2), 142-153.

Bandura, A. (2000). Exercise of human agency through collective efficacy. *Current Directions in Psychological Sciences*, 9(3), 75-78.

Boal, A. (1979). *The theatre of the oppressed.* New York: Uziden Press.

Bronfenbrenner, U. (1979). *The ecology of human development.* Cambridge, MA: Harvard University Press.

Bronfenbrenner, U., & Ceci, S. J. (1994). Nature-nurture reconceptualized in developmental perspective: a bioecological model. *Psychological Review*, 101(4), 568–586.

Browning, C.R., Leventhal, T., & Brooks-Gunn, J. (2005). Sexual initiation in early adolescence: the nexus of parental and community control. *American Sociological Review*, 70(5), 758-778.

Buka, S.L., Brennan R.T., Rich-Edwards, J.W., Raudenbush, S.W, & Earls, F. (2003). Neighborhood support and the birth weight of urban infants. *American Journal of Epidemiology,* 157(1), 1-8.

Cagney, K., & Browning, C.R. (2004). Exploring neighborhood-level variation in asthma: the contribution of neighborhood social context. *Journal of General Internal Medicine,* 19(3), 229-236.

Campbell, M.K., Elbourne, D.R., & Altman, D.G. for the CONSORT Group. (2004). The CONSORT statement: extension to cluster randomised trials. *British Medical Journal*, 328, 702-8.

Carlson, M., & Earls, F. (2011a). Adolescents as deliberative citizens: building health competence in local communities. *The Annals of the American Academy of Political & Social Science,* 633(1), 223-242.

Carlson, M., & Earls, F. (2011b). A health promotion curriculum for adolescent young citizens: deliberation and public action for HIV/AIDS competent communities. *American Journal of Orthopsychiatry*, 81(4), 453–460.

Census of Tanzania. (2002). National Bureau of Statistics http://www.nbs.go.tz/tnada/index.php/catalog/7 (accessed 10/26/2011).

Chan, B., Trickett, B., Carlson, M., & Earls, F. (2003). Youth participation: a critical element of research on child well-being. In R.M. Lerner, & B.L. Benson (Eds.), *Developmental Assets and Asset-Building Communities: Implications for Research Policy and Programs* (pp. 65-96). New York: Kluwer-Plenum.

Earls, F., & Carlson, M. (2001). Social ecology of child health and well-being. *Annual Review of Public Health,* 43, 143-166.

Earls, F., & Carlson, M. (2002). Adolescents as collaborators: in search of well-being, In M.Tienda & W.J. Wilson (Eds.) *Youth in Cities: A Cross-National Perspective* (pp. 58-83). New York: Cambridge University Press.

Earls, F., Raviola, G., & Carlson, M. (2008). Promoting child and adolescent mental health in the context of the HIV/AIDS pandemic with a focus on sub-Saharan Africa. *Journal of Child Psychology and Psychiatry,* 49(3), 294-312.

Goldstein, H., Browne, W., & Rasbash, J. (2002). Multilevel modelling of medical data. *Statistics in Medicine, 21,* 3291-3315.

Habermas, J. (1984). *The Theory of Communicative Action. Vol.1, Reason and Rationalization of Society*. Boston MA: Beacon.

Habermas, J. (1987). *The Theory of Communicative Action. Vol. 2, Lifeworld and System: A Critique of Functionalist Reason*. Boston MA: Beacon.

Kamo, N., Carlson, M., Brennan, R., & Earls, F. (2008). Young citizens as health agents: use of drama in promoting community efficacy for HIV/AIDS. *American Journal Public Health,* 98(2), 201-204.

Kapiga, S., Sam, N.E., Mlay, J., & Larsen, U. (2006). The epidemiology of HIV-1 infection in northern Tanzania: results from a community-based study. *AIDS Care,* 18(4), 379-387.

Kawai, K., Kaaya, S.F., Kajula, L., Mbwambo, J., Kilonzo, G.P., & Fawzi, W.W. (2008). Parents' and teachers' communication about HIV and sex in relation to the timing of sexual initiation among young adolescents in Tanzania. *Scandinavian Journal Public Health*, 36(8), 879-888.

Lochner, K.A., Kawachi, I., Brennan, R.T., & Buka, S.L. (2003). Social capital and neighborhood mortality rates in Chicago. Social Science & Medicine, 56, 1797-1805.

Liu, X., Spybrook, J., Congdon, R., Martinez, A., & Raudenbush, S. (2009). *Optimal Design for Multi-level and Longitudinal Research. Computer Software*. Ann Arbor, MI: Survey Research Center.

Molnar, B.E., Buka, S.L., Brennan, R.T., Holton, J.K., & Earls, F. (2003). A multilevel study of neighborhoods and parent-to-child physical aggression: results from the Project on Human Development in Chicago Neighborhoods. *Child Maltreatment,* 8(2), 84-97.

McCartney, K., & Rosenthal, R. (2000). Effect size, practical importance, and social policy for children. *Child Development*, 71 (1), 173-180.

Morse, M. (2008). Young citizens: a case study of institutionalizing children's participation in community decision-making. *Children's Legal Rights Journal*, 28 (3), 23-55.

Onyango-Ouma, W., Aagaard-Hansen, J., & Jensen, B.B. (2005). The potential of school children as health change agents in rural western Kenya. *Social Science & Medicine*, 611(8), 1711-1722.

Sampson, R., Morenoff, J., & Earls, F. (1999). Beyond social capital: spatial dynamics of collective efficacy for children. *American Sociological Review*, 64(5), 633-660.

Sampson, R.J., Morenoff, J., & Raudenbush, S.W. (2005). Social anatomy of racial and ethnic disparities in violence. *American Journal of Public Health*, 95(2), 224-232.

Sampson, R., Raudenbush, S.W., & Earls, F. (1997). Neighborhoods and violent crime: a multilevel study of collective efficacy. *Science*, 227(5328), 918-924.

Sen, A.K. (1992). *Inequality Reexamined.* Oxford: Oxford University Press.

Sen, A.K. (1999). *Development as Freedom*. New York: Knopf.

Sternthal, M., Jun, H.I., Earls, F., & Wright, R. (2010). Community violence and urban childhood asthma: a multilevel analysis. *European Journal of Respiratory Diseases,* 36(6), 1400-1409.

United Republic of Tanzania. (1998). Policy paper on local government reform, Dar es Salaam: Ministry of Regional Administration and Local Government http://www.logintanzania.net/docs/policy_paper1998.pdf (accessed October 26, 2011).

Wellings, K., Collumbien, M., Slaymaker, E., Singh, S., Hodges, Z., Patel, D., & Bajos, N. (2006). Sexual behaviour in context: a global perspective. *Lancet,* 368 (9548), 1706-1728.

Willett, J. B. (1989). Questions and answers in the measurement of change. *Review of Research in Education, 15*, 345-422

World Health Organization. (1986). *Ottawa Charter on Health Promotion,* World Health Organization, Copenhagen, http://www.who.int/hpr/NPH/docs/ottawa_charter_hp.pdf (accessed 10/26/2011).

Xue, Y., Leventhal, T., Brooks-Gunn, J., & Earls, F. (2005). Neighborhood residence and mental health problems of 5- to 11-year olds. *Archives of General Psychiatry*, 62(5), 554-563.

**Table 1**

Items composing scales of self- and collective efficacy and measures of internal consistency in post-treatment health assessment (2006) and community survey (2005)

Individual-level scales [a]

Deliberative self-efficacy (5 items) reliability = .78 [b]

*I have learned how:*

- to express my opinions to other children my age
- to make my ideas understood when other children disagree with me
- to use talking and reasoning to solve problems I have with other children
- other children and adults will value me even if they disagree with my opinions
- to express my opinions to adults [c]

Communicative self-efficacy (6 items) reliability = .80

*I have learned how:*

- to have adults listen to me [c]
- to ask assistance from adults about how to solve any problems [c]
- to handle my problems
- to ask adults for advice about sexually transmitted diseases [c]
- to talk with adults about what troubles me [c]
- to express those thoughts and feelings that are important to me

Academic self-efficacy (3 items) reliability = .62

*I have learned how:*

- to do best on tests
- hard work helps me in math
- to do my best in language study

Emotional control (5 items) reliability = .77

*I have learned how:*

- to manage my feelings
- to express feelings important to me

to be a good friend

recognize my strengths and talents

to understand and accept myself

Peer resistance (2 items) reliability = .77

*I have learned how:*

to say no to alcohol

to say no to sex

Neighborhood-level scales [d]

Child collective efficacy (4 items) reliability = .77 [e]

*Adolescents (ages 10-14) in the neighborhood:*

can converse freely and openly with adults about HIV/AIDS

can teach adults some scientific facts about HIV/AIDS

can be as effective as adults in educating the community about HIV/AIDS

can decrease discrimination towards HIV positive people

Neighborhood collective efficacy (6 items) reliability = .73

*In this community, neighbors will take action:*

to stop children from getting in trouble

to do something about a child out of school

to scold a child who is disrespectful

to break up fights

to get food or medicine for sick neighbors

to share water with neighbors

Neighborhood problems (5 items) reliability = .59

*You believe that, in this community:*

AIDS is getting worse

groups of teens are causing trouble

robberies are occurring

violent arguments are occurring

rapes are occurring

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[a] All individual-level items are coded on a 3-point Likert scale of agreement. [b] All reliabilities are estimated with Cronbach's *alpha*. [c] Items added in post-treatment health assessment. [d] All neighborhood-level items are coded on a 4-point Likert scale of agreement. [e] Items added in post-treatment community survey.

**Table 2**
Pre-treatment comparison of treatment and control *mitaa* on demographic and household characteristics (community survey, 2004)

| Variable | Treatment proportion | Control proportion | *t*-ratio[a] | *p*-value |
|---|---|---|---|---|
| No schooling | 0.06 | 0.06 | -0.01 | 1.00 |
| Primary schooling | 0.67 | 0.62 | 0.88 | 0.39 |
| Secondary schooling | 0.26 | 0.32 | -0.94 | 0.35 |
| University education | 0.05 | 0.08 | -0.99 | 0.33 |
| Gainful employment | 0.25 | 0.27 | -0.29 | 0.78 |
| Home ownership | 0.40 | 0.40 | -0.06 | 0.95 |
| Know *mtaa* leader | 0.07 | 0.06 | 1.18 | 0.25 |
| Will move from *mtaa* | 0.12 | 0.15 | -0.91 | 0.37 |
| Poor flooring | 0.16 | 0.12 | 0.84 | 0.41 |
| Piped water | 0.49 | 0.51 | -0.17 | 0.87 |
| Flush/pour flush toilet | 0.41 | 0.38 | 0.16 | 0.88 |
| Electricity in home | 0.50 | 0.58 | -0.82 | 0.42 |
| Modern-fueled stove | 0.37 | 0.33 | 0.62 | 0.54 |
| Owns refrigerator | 0.22 | 0.28 | -0.75 | 0.46 |
| Owns radio | 0.91 | 0.92 | -0.52 | 0.60 |
| Owns phone | 0.47 | 0.52 | -0.78 | 0.44 |
| Owns TV | 0.23 | 0.34 | -1.44 | 0.16 |
| Owns bicycle | 0.29 | 0.36 | -1.00 | 0.33 |
| Owns motorcycle | 0.04 | 0.04 | 0.12 | 0.91 |
| Owns car or lorry | 0.11 | 0.17 | -1.08 | 0.29 |
| Reads newspaper | 0.80 | 0.84 | -0.69 | 0.50 |
| Listens to radio | 0.95 | 0.98 | -1.12 | 0.27 |
| Watches TV | 0.55 | 0.63 | -1.23 | 0.23 |
| Uses computer weekly | 0.09 | 0.10 | 0.17 | 0.87 |

**Table 3**
Post-treatment descriptive individual- and neighborhood-level statistics and intra-class correlations (ICC) for efficacy scales for treatment and control *mitaa* on health assessment (2006) and community survey (2005).

Individual-level scale

| | Deliberative efficacy | Communicative efficacy | Academic efficacy | Emotional control | Peer resistance |
|---|---|---|---|---|---|
| | Treatment neighborhoods | | | | |
| Number of cases | 301 | 302 | 305 | 308 | 300 |
| Mean | 14.79 | 15.18 | 8.64 | 13.59 | 5.56 |
| Standard deviation | 3.00 | 3.11 | 0.75 | 1.91 | 1.11 |
| | Control neighborhoods | | | | |
| Number of cases | 289 | 291 | 294 | 296 | 283 |
| Mean | 14.04 | 14.33 | 8.59 | 13.24 | 5.65 |
| Standard deviation | 3.23 | 3.44 | 0.86 | 2.20 | 0.98 |
| | All neighborhoods | | | | |
| Null Model ICC [a,] | 4.482% | 2.783% | 2.333% | 1.717% | 1.669% |
| *p*-value | 0.001 | 0.018 | 0.039 | 0.079 | 0.093 |
| Control model ICC [a] | 1.367% | 1.254% | 0.137% | 0.032% | 0.958% |
| *p*-value | 0.012 | 0.013 | 0.078 | 0.199 | 0.024 |
| Full model ICC [a] | 0.310% | 0.019% | 0.188% | 0.017% | 0.832% |
| *p*-value | 0.202 | 0.349 | 0.097 | 0.408 | 0.027 |

Neighborhood-level scale

| | Child collective efficacy | Neighborhood collective efficacy | Neighborhood problems |
|---|---|---|---|
| | Treatment neighborhoods | | |
| Number of cases | 550 | 576 | 504 |
| Mean | 11.90 | 2.64 | 2.21 |

| | | | |
|---|---|---|---|
| Standard deviation | 2.50 | 0.92 | 0.92 |
| | Control neighborhoods | | |
| Number of cases | 392 | 458 | 398 |
| Mean | 10.91 | 2.69 | 2.15 |
| Standard deviation | 2.74 | 0.92 | 0.96 |
| | All neighborhoods | | |
| Null Model ICC [a,] | 6.536% | 7.839% | 8.242% |
| *p*-value | <0.001 | <0.001 | <0.001 |
| Control model ICC [a] | 6.2% | 4.214% | 3.343% |
| *p*-value | <0.001 | <0.001 | 0.004 |
| Full model ICC [a] | 3.751% | 4.327% | 3.670% |
| *p*-value | 0.002 | <0.001 | 0.003 |

[a] The ICC values are converted to percentages

**Table 4**

HLM[a] estimates of treatment effect size and individual-level covariates[b] (post-treatment health assessment, 2006)

| Predictor | Value | Est coeff[c] (95% CI[d]) | SE[e] | *t*-ratio[f] | *p*-value |
|---|---|---|---|---|---|
| | | Deliberative efficacy | | | |
| Intercept | | 13.73 (13.27 – 14.19) | 0 | 58.43 | <0.001 |
| Treatment | | 1.00 (0.44 – 1.56) | 0.28 | 3.52 | <0.001 |
| Effect size | 0.27 | | | | |
| Individual-level covariates | | | | | |
| Child age | | 0.33 (0.14 – 0.53) | 0.10 | 3.40 | <0.001 |
| Male | | 0.41 (-0.07 – 0.90) | 0.25 | 1.70 | 0.10 |
| Mother deceased | | -0.57 (-2.92 – 0.89) | 0.74 | -0.77 | 0.44 |
| Father deceased | | -0.11 (-0.90 – 0.69) | 0.41 | -0.69 | 0.79 |
| Both deceased | | 1.03 (-1.15 – 3.21) | 1.11 | 0.93 | 0.36 |
| Household wealth | | 0.19 (-0.09 – 0.47) | 0.15 | 1.32 | 0.19 |
| Pre-test | | 0.31 (0.22 – 0.40) | 0.04 | 7.06 | <0.01 |
| | | Communicative efficacy | | | |
| Intercept | | 13.97 (13.48 – 14.45) | 0.25 | 56.93 | <0.001 |
| Treatment | | 118 (0.60 – 1.77) | 0.30 | 3.96 | <0.001 |
| Effect size | 0.30 | | | | |
| Individual-level covariates | | | | | |
| Child age | | 0.41 (0.21 – 0.61) | 0.10 | 4.02 | <0.001 |
| Male | | 0.37 (-0.15 – 0.88) | 0.26 | 1.40 | 0.16 |
| Mother deceased | | -1.72 (0.80 – -2.16) | 0.80 | -2.16 | 0.03 |
| Father deceased | | -0.60 (-1.45 – 0.24) | 0.43 | -1.40 | 0.16 |
| Both deceased | | 2.38 (0.05 – 4.72) | 1.19 | 2.00 | 0.05 |
| Household wealth | | 0.14 (-0.16 – 0.44) | 0.15 | 0.89 | 0.37 |
| Pre-test | | 0.40 (0.25 – 0.55) | 0.08 | 5.23 | <0.001 |
| | | Academic efficacy | | | |
| Intercept | | 8.57 (8.45 – 8.69) | 0.06 | 140.99 | <0.001 |

| | | | | | |
|---|---|---|---|---|---|
| Treatment | | 0.08 (-0.07 – 0.22) | 0.07 | 1.07 | 0.28 |
| Effect size | 0.08 | | | | |
| Individual-level covariates | | | | | |
| Child age | | 0.01 (-0.04 – 0.06) | 0.03 | 0.24 | 0.81 |
| Male | | 0.06 (-0.07 – 0.18) | 0.06 | 0.87 | 0.39 |
| Mother deceased | | 0.14 (-0.25 – 0.52) | 0.20 | 0.70 | 0.49 |
| Father deceased | | 0.08 (-0.13 – 0.29) | 0.11 | 0.75 | 0.45 |
| Both deceased | | -0.25 (-0.83 – 0.33) | 0.30 | -0.86 | 0.39 |
| Household wealth | | 0.06 (-0.01 – 0.13) | 0.04 | 1.62 | 0.11 |
| Pre-test | | 0.11 (0.05 – 0.18) | 0.03 | 3.64 | <0.001 |
| | | Emotional control | | | |
| Intercept | | 13.09 (12.79 – 13.39) | 0.15 | 85.35 | <0.001 |
| Treatment | | 0.41 (0.05 – 0.77) | 0.19 | 2.21 | 0.03 |
| Effect Size | 0.17 | | | | |
| Individual-level covariates | | | | | |
| Child age | | 0.26 (0.14 – 0.39) | 0.06 | 4.14 | <0.001 |
| Male | | 0.26 (-0.06 – 0.58) | 0.16 | 1.59 | 0.12 |
| Mother deceased | | -0.88 (-1.91 – 0.16) | 0.53 | -1.66 | 0.10 |
| Father deceased | | 0.03 (-0.49 – 0.55) | 0.26 | 0.12 | 0.90 |
| Both deceased | | 1.09 (-0.43 – 2.60) | 0.77 | 1.40 | 0.16 |
| Household wealth | | 0.13 (-0.06 – 0.31) | 0.10 | 1.31 | 0.19 |
| Pre-test | | 0.20 (0.13 – 0.28) | 0.04 | 5.22 | <0.001 |
| | | Peer resistance | | | |
| Intercept | | 5.71 (5.54 – 5.88) | 0.09 | 65.61 | <0.01 |
| Treatment | | -0.06 (-0.28 – 0.15) | 0.11 | -0.59 | 0.55 |
| Effect Size | 0.04 | | | | |
| Individual-level covariates | | | | | |
| Child age | | 0.10 (0.03 – 0.17) | 0.03 | 2.97 | <0.003 |
| Male | | -0.14 (-0.31 – 0.04) | 0.09 | -1.56 | 0.12 |
| Mother deceased | | -0.05 (-0.58 – 0.48) | 0.27 | -0.18 | 0.86 |

| | | | | |
|---|---|---|---|---|
| Father deceased | -0.21 (-0.49 – 0.07) | 0.14 | -1.50 | 0.13 |
| Both deceased | 0.29 (-0.51 – 1.08) | 0.41 | 0.71 | 0.48 |
| Household wealth | 0.10 (0.00 – 0.20) | 0.05 | 1.95 | 0.05 |
| Pre-test | 0.09 (0.02 – 0.16) | 0.04 | 2.55 | 0.01 |

HLM[a] = hierarchical linear modeling; [b] Neighborhood-level covariates are not shown; Est coeff; [c] = unstandardized fixed effect coefficient estimated by HLM; CI[d] = Confidence interval; SE[e] =Standard Error; *t*-ratio[f] values are based on 690 degrees of freedom.

**Table 5**

HLM[a] estimates of treatment and effect size for neighborhood-level outcomes (post-treatment community survey, 2005)

| Predictor | Value | Est Coeff [c] (95% CI[d]) | SE[e] | *t*-ratio[b] | *p*-value |
|---|---|---|---|---|---|
| | | Child collective efficacy | | | |
| Intercept | | 10.92 (10.49 – 11.34) | 0.21 | 52.56 | <0.001 |
| Treatment | | 0.91 (0.28 – 1.54) | 0.31 | 2.97 | 0.01 |
| Effect size | 1.36 | | | | |
| Neighborhood–level covariates | | | | | |
| Population density | | -22.07 (-161.72 – 117.58) | 68.19 | -0.32 | 0.75 |
| Primary education | | -5.29 (-13.82 – 3.24) | 4.16 | -1.27 | 0.22 |
| Secondary education | | -4.11 (-13.37 – 5.16) | 4.52 | -0.91 | 0.38 |
| University education | | -4.64 (-9.58 – 0.29) | 2.41 | -1.93 | 0.07 |
| Gainful employment | | 1.30 (-3.26 – 5.86) | 2.23 | 0.58 | 0.57 |
| Wealth | | 0.17 (-0.82 – 1.16) | 0.48 | 0.35 | 0.73 |
| Home ownership | | 0.07 (-2.32 – 2.47) | 1.17 | 0.06 | 0.95 |
| Years in residence | | -0.08 (-0.22 – 0.05) | 0.07 | -1.27 | 0.22 |
| Knows *mtaa* leader | | -2.68 (-11.29 – 5.93) | 4.21 | -0.64 | 0.53 |
| | | Neighborhood collective efficacy | | | |
| Intercept | | 2.69 (2.54 – 2.83) | 0.07 | 37.22 | <0.001 |
| Treatment | | -0.08 (-0.30 – 0.14) | 0.11 | -0.72 | 0.48 |
| Effect size | 0.76 | | | | |
| Neighborhood–level covariates | | | | | |
| Population density | | 44.05 (-4.91 – 93.00) | 23.91 | 1.84 | 0.08 |
| Primary education | | 0.51 (-2.50 – 3.53) | 1.47 | 0.35 | 0.73 |
| Secondary education | | 1.06 (-2.20 – 4.32) | 1.59 | 0.67 | 0.51 |
| University education | | 0.29 (-1.47 – 2.05) | 0.86 | 0.34 | 0.74 |
| Gainful employment | | -0.24 (-1.85 – 1.37) | 0.79 | -0.31 | 0.76 |
| Wealth | | -0.28 (-0.62 – 0.07) | 0.17 | -1.65 | 0.12 |
| Home ownership | | 0.55 (-0.29 – 1.38) | 0.41 | 1.34 | 0.20 |
| Years in residence | | 0.01 (-0.04 – 0.06) | 0.02 | 0.43 | 0.68 |

| | | | | | |
|---|---|---|---|---|---|
| Knows *mtaa* leader | | 1.14 (-1.90 – 4.19) | 1.49 | 0.77 | 0.45 |
| | | Neighborhood problems | | | |
| Intercept | | 2.15 (2.00 – 2.30) | 0.07 | 29.50 | <0.001 |
| Treatment | | 0.03 (-0.19 – 0.25) | 0.11 | 0.26 | 0.80 |
| Effect size | 0.12 | | | | |
| Neighborhood–level covariates | | | | | |
| Population density | | 36.95 (-12.71 – 86.61) | 24.25 | 1.52 | 0.14 |
| Primary education | | 0.61 (-2.46 – 3.68) | 1.50 | 0.41 | 0.69 |
| Secondary education | | 1.26 (-2.05 – 4.57) | 1.62 | 0.78 | 0.45 |
| University education | | 0.91 (-0.89 – 2.72) | 0.88 | 1.04 | 0.31 |
| Gainful employment | | 0.71 (-0.93 – 2.35) | 0.80 | 0.89 | 0.38 |
| Wealth | | -0.48 (-0.82 – -0.14) | 0.17 | -2.89 | 0.01 |
| Home ownership | | 0.38 (-0.46 – 1.23) | 0.41 | 0.93 | 0.36 |
| Years in residence | | 0.01 (-0.04 – 0.06) | 0.02 | 0.32 | 0.75 |
| Knows *mtaa* leader | | 1.53 (-1.49 – 4.54) | 1.47 | 1.04 | 0.31 |

HLM[a]= hierarchical linear modeling; [b]All *t*-ratio values are based on 19 degrees of freedom; Est coeff[c] = unstandardized fixed effect coefficient estimated by HLM; CI[d] = Confidence interval; SE[e] = Standard Error.