Associations between the Life Course Development Model of Community Capacity Building and Abuse among Children and Adolescents in Washington State

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Adverse childhood experiences (ACEs), including experiences of physical abuse, bullying, harassment, household dysfunction or dating abuse in the first 18 years of life, have a significant impact on child health and health outcomes later in life.[1] Abused children face increased mortality and morbidity from many common diseases, such as cancer, heart, lung and liver disease,[2] long term changes in brain structure and function,[3,4,5] and wear and tear on the body from repeated stress, creating physiological effects with long-term adverse health effects.[6,7] Adults with documented histories of ACEs have lower levels of education, employment, earnings, and fewer assets as adults.[8] Abuse is a community concern as extensive research has shown that family violence is pervasive and not limited to any specific race, class, or culture.[9]

In Washington State, 17% of Washington State adults report exposure to physical abuse in childhood, of these 84% reported at least 2 additional ACEs showing that exposure to physical abuse and violence clusters with other ACEs.[10] Children exposed to physical violence at home are more likely to be in peer relationships that involve abuse as well[7] reflecting an intergenerational transmission of violence—from exposure to violence in childhood to experiencing and perpetrating abuse as an adult—with this pattern often manifesting in adolescent dating experiences.[11,12,13,14,15]

Complex Systems Theory: A Framework for Reducing Adverse Childhood Experiences

Complex systems theory[16,17] recognizes that individual and population health stems from the functioning of systems and the interrelations between a systems' diverse components.[17,18,19,20,21] Applied to community-level interventions, a focus on context is as important as a focus on individuals and successful interventions create health-promoting community supports and resources while building capacity for future problem-solving and development. Specifically, collaborative, multi-level, culturally influenced intervention techniques aimed at understanding dynamic interrelations between multiple components are essential to the community-level paradigm emerging from complex systems theory.[22]

This community-level intervention paradigm is important to efforts to reduce ACEs because strong community collaboration strengthens local community capacity to deal with large, multi-tiered health issues such as abuse, which is an inter-generational problem within a family structure. Community interventions are complex interactions, requiring empowering collaboration and interconnectedness between structure, process and goals of the intervention. Lastly, community interventions must be culturally situated, which is important to ACEs as cultural sensitivity and specific protective and risk

factors for experiences of abuse are a large part of successful reaching families and youth at risk for abuse.

Reducing ACEs in Washington State: The Life Course Development Model

Washington's communities are complex systems, within which state and local programs seek to reduce exposure to ACEs. As part of these efforts, the Washington State Family Policy Council (FPC), a government cross-agency approved by statutory authorization in 1992, partnered with 42 local affiliates (Community Public Health and Safety Networks, hereafter Community Networks) to build community capacity by identifying "priorities and opportunities and to foster and sustain positive neighborhood change."[23] The Community Networks aim to create environments for residents that support community members in efforts to reduce rates of child abuse, domestic violence, youth violence, school dropouts, teen pregnancy, youth suicide, youth substance abuse, infant mortality and child out-of-home placement.[24]

Consistent with the intergenerational nature of child abuse, the FPC Community Networks adopted a Life Course Development Model (LCDM) framework for community capacity building to reduce ACEs. As emphasized in complex systems theory, the LCDM perspective views the community environment as a strong influence on individual health. [25] Furthermore, physical or social exposures at each stage of the life course—during gestation, childhood, adolescence, young adulthood and later adult life—are viewed as having effects on later health or disease risk.[25,26,27,28,29,30,31] Applied to ACEs, communities that have adopted the LCDM framework apply community interventions across a wide age range, positing that interruption of abuse patterns at any stage of the life course reduces abuse rates within the community and in future generations. In contrast, Community Networks that do not follow the LCDM approach aim interventions at specific age groups, and all community intervention resources are focused on this defined age population.

The proposed research takes advantage of a natural experiment in Washington State where some counties have adopted the FPC model of community capacity building and others have not. Accordingly, we were able to examine and compare self-reports of abuse among youth residing in counties with established Community Networks following and not following the LCDM. We hypothesized that residence in a county that adopted the LCDM approach to improving community capacity would be associated with fewer reports of abuse among youth.

METHODS

In this cross-sectional cohort study, we used data collected for the Washington State 2010 Healthy Youth Survey (HYS), Forms B and NS. Since 2002, the HYS has been administered to students in 6th, 8th, 10th and 12th grades in Washington State public schools every other October. Following randomization, participation is voluntary for both schools and students. Students are informed that their answers are anonymous before participating in the survey. The survey is administered in English; every county in WA administers the HYS. The survey design includes clustered sampling.

Of the 27,751 students responding to the 2010 HYS (8th, 10th, and 12th grades, as 6th graders do not receive forms B and NS), 8,845 were eligible for inclusion in the study because they resided in counties that either had or had not adopted the LCDM of community capacity building. Residents of 26 counties in which the LCDM was only partially implemented were not eligible for the study. All 8th grade students (n=2,603) from LCDM and non-LCDM counties were excluded from the analysis because more than 40% did not answer, or were not asked, the questions related to abuse examined in this study. Finally, 892 students were excluded from the study sample because they were missing data for all four of the outcomes examined in the study, 3 were excluded because they were missing data for key independent variables. The final analysis sample included n = 5,347 10th and 12th grade students.

Variables

Independent variable. The main independent variable was an indicator of residence in a WA county with a Community Network that had adopted a LCDM approach to community capacity building. County-level geocodes were used to categorize whether students resided in a LCDM county or a control county where the LCDM had not been implemented. See Table 1 for a summary of select socio-demographic characteristics of the five LCDM counties and the seven control counties in which the students resided.

Dependent variables. Four binary outcomes (coded yes=1, no =0) were derived from students' responses to four survey questions focused on abuse describing exposure to abuse from an adult (lifetime) or dating partner (past 12 months) (Table 2).

Covariates. All regression models were adjusted for covariates that might confound relationships between experiences of abuse and residence in a LCDM county: age measured in years, race/ethnicity

(White or Caucasian=reference, Hispanic or Latino/Latina, Black or African American, American Indian or Alaskan Native, Asian or Asian American, Native Hawaiian or other Pacific Islander, Other (including selection of more than one race), maternal education (less than high School (HS), HS graduate/GED, some college or technical training, college graduate, Graduate degree, and don't know/not applicable).

Statistical Analysis

The distribution of all study variables was examined and compared for students residing in LCDM counties with those residing in comparison counties using t-tests and chi-square tests. Survey-weighted logistic regression was used to test associations between residence in a LCDM county and abuse experience. Partial f-tests were used to test effect modification of LCDM residence by sex and grade. If significant, results from stratified models were reported. Stata version 11 (StataCorp LP, College Station, TX) was used for all statistical analysis and survey weights were applied to account for the complex survey design and to make the estimates generalizable to the larger population.

RESULTS

On most county-level socio-demographic variables the LCDM and non-LCDM counties were substantively similar (Table 1). Non-LCDM counties had larger population size (over 100,000 residents) especially in three counties: Clark, Snohomish, and Spokane. Additionally, compared to non-LCDM counties, the LCDM counties had slightly lower unemployment, median age, proportion white and household income and a slightly higher proportion with college education.

All results are stratified by grade (10^{th} vs 12^{th}) and sex (female, male) as significant effect modification was found related to these covariates. The distribution of most demographic characteristics of the youth did not differ significantly between the LCDM and non-LCDM counties (Table 3). In all age- and sex-strata, students living in non-LCDM counties were more likely to be White or Caucasian than their peers residing in LCDM counties. Additionally, in both grade strata, there was a greater proportion of male students in LCDM counties at older ages than in non-LCDM counties. Unadjusted estimates (Table 4) showed the proportion of youth reporting the four types of abuse ranged from 3%-33%. In general, girls reported higher rates of abuse by adult and being threatened by a partner while boys reported higher rates of witnessing adult on adult abuse and being abused themselves by a partner. The proportions of youth reporting each of the four outcomes were not statistically significantly different by residence in a LCDM county with one exception: twelfth grade girls residing in LCDM counties were significantly less likely to experience partner abuse compared to their counterparts in non-LCDM counties.

Abuse from Adult

In the fully adjusted logistic regression models (Table 5), 12th grade boys living a LCDM county had lower odds of reporting physical abuse by an adult relative to their counterparts in non-LCDM counties (OR=0.72; 95% CI: 0.51, 1.02). This finding approached but did not reach statistical significance (p=0.07). In this model, older age was also associated with higher odds of reporting physical abuse by an adult. In the other stratified models, significant correlates of reporting abuse by an adult included self-identification as Native American (NA), Asian/Pacific Islander (API), or Other Race (OthRc) and low maternal education among 10th grade girls; and identifying as African or African-American (AA) or having a mother with less than a HS diploma among 12th grade girls and 10th grade boys.

Witnessing Adult Abuse

In the fully adjusted logistic regression models, 12th grade boys living in a LCDM county had lower odds of reporting witnessing abuse by an adult relative to their counterparts in non-LCDM counties (OR=0.70, 95% CI: 0.48, 1.03). Again, this finding approached but did not reach statistical significance (p=0.07). In this model, older age, identifying as NA and low maternal education were also associated with higher odds of reporting witnessing abuse by an adult. In the other stratified models, significant correlates of reported witnessed abuse by an adult included self-identification as NA and low maternal education for 10th grade females and males; and identifying as API or OthRc for 10th grade girls; and older age among 12th grade females.

Threatened by Dating Partner

In the fully adjusted logistic regression models, 12th grade boys living in a LCDM county had significantly lower odds of reporting being threatened by a dating partner relative to their counterparts in non-LCDM counties (OR=0.60, 95% CI: 0.37, 0.96). In the other stratified models, significant findings included low maternal education for 12th grade girls and 10th grade boys; self-identifying as API or OthRc for 10th grade females; NA for 12th grade females; and older age among 10th grade males.

Abuse from Dating Partner

In the fully adjusted logistic regression models, 12th grade girls living in a LCDM county had significantly lower odds of reporting being abused by their dating partner relative to their counterparts in non-LCDM counties (OR=0.45, 95% CI: [0.25, 0.80]). In the other stratified models, significant correlates of threats of abuse from dating partners included Hispanic, AA, or OthRc among 10th grade females and males; low maternal education among 10th and 12th grade females; self-reporting NA among 10th grade females; and older age among 10th grade males.

DISCUSSION

In a population-based Washington State sample of 10th and 12th grade students, we found evidence that the LCDM of capacity building may be effective at reducing youth experiences of abuse, especially among youth in 12th grade. Specifically, 12th grade males living in LCDM counties appear to have lower odds of being threatened by a dating partner, while 12th grade girls living in LCDM counties report lower odds of abuse from a dating partner compared to controls.

Our findings provide new information about community-level interventions that build capacity and follow a LCDM consistent with complex systems theory. Evidence shows that community interventions that reflect the compounded nature of health inequalities[32,33,34,35] and partner with communities[36,37,38,39,40,41,42] are the preferred approach to addressing important health concerns. As community capacity has grown in LCDM counties for the past 10 years as monitored by the FPC, the capacity for change has been supported in these communities.

The increased capacity and support in LCDM counties across the life course may have influenced the actions of the adults in the community, leading to lower odds of youth experiencing abuse from the adults in LCDM counties. As the LCDM considers not just one time period in an individual's life as a cause for a disease or condition, but the entire life cycle and accumulated experiences as influences on health, breaking the pattern of abuse at any stage along the life course is an essential component to reducing ACEs in a community.[43] Furthermore, if learned behavior responses, such as of abuse, are interrupted along the development pathway, there would then be reduced rates of abuse in subsequent generations. When this cycle of abuse is interrupted, the future odds of experiences and inflicting abuse on others are reduced.[44]

Differences in our findings by sex may be explained by several potential pathways. Previous studies show that partner violence is mostly reciprocal in nature – partners in a violent relationship are likely to be perpetrators.[45,46] Perhaps the reduction in dating abuse seen in the female cohort is because 12th grade boys are less likely to perpetrate abuse. Similarly, the reduction is reporting threats from a partner may be because the girls, in turn, are less likely to threaten their boyfriends. The reduced abuse odds in 12th graders may be circular – one reduction is associated with the other. Health and school-based workers in youth services have had a hard time changing peer relationships in high school age youth as adolescent intervention and behavior change is challenging. This study offers a unique look into how a life course perspective to community capacity building can have a significant effect on the patterns of

adolescent youth abuse experiences. Further research on gender differences and partner violence is an important area for further study.

We found no significant effects of LCDM county residence on the abuse experiences of youth in 10th grade. Possibly this is due to the fact that 10th grade youth are younger than their 12th grade counterparts, and may have had less exposure to dating. Previous studies have found that for adolescents of both genders, the odds of experiencing physical abuse roughly double or triple with increased age and with increased number of relationships.[47]

We also found no significant reduction of adult abuse exposure among either non-LCDM or LCDM county youth. This may not necessarily mean that the Community Networks are not having an influence across these communities; it could be a result of the limited number of years the Community Networks have been in place and or their degree of influence across complex community systems. The Networks have been in place 20 years, but the LCDM perspective has been implemented only 10 years. This amount of time is not long enough for adults who were first exposed to LCDM community-level interventions to have children themselves who are now in 10th and 12th grade (15-19 years old). While a 2nd generation of LCDM county residents are being exposed to the LCDM model of community capacity building, it will be at least 5 more years before the 2nd generation is answering HYS questions (at this grade level) related to ACEs. Following trends of reported ACEs among LCDM county youth within a prospective cohort study design across multiple years of data would be a valuable area for further research.

Strengths and Limitations

To our knowledge this is the first study to examine the effects of the LCDM of capacity building on the experiences abuse among youth. Study strengths include the large sample size. Results must also be interpreted in light of several limitations. First, the findings may be attributed to unmeasured confounding at the individual- or county-level that we were unable to measure. For instance, maternal education was the only available measure of socio-economic status (SES) available in the HYS and may be insufficient to fully capture SES such as the effects of income, wealth, and parent's occupation. Second, the study used a cross-sectional design and the results cannot be used to infer causation. Additionally, all data were self-reported from youth in public schools and thus it is not known to what extent reports accurately reflect actual levels of abuse.

Conclusions

Our findings suggest that residence in a county with the LCDM model of capacity building may be protective against experiences of dating abuse by older adolescent males and females. More research is necessary to better understand the relationship that increased community capacity following the life course development model has on reducing the rates of child abuse. As stated by the prominent epidemiologist William H Foege, “the public health impact of ACEs can now only be ignored as a matter of conscious choice. Thus, with this information comes *the responsibility to use it*.”[48]

TABLES

LIST OF TABLES

Table 1. Sociodemographic Characteristics* of Life Course Development Model and non-LCDM counties, Washington State

County	Study Sample (N=)	Population	Un-employment **	Median Age (yrs)	Median Household Income	Education (bachelors or higher)	Primary Race, White (%)	% of Population 10-19 yrs
LCDM Counties (n=1,679)								
Adams	196	17,285	8.4%	29.6	$33,888	12.2%	67.4%	18.2%
Okanogan	295	40,033	10.6%	38.2	$29,726	15.9%	77.9%	16.4%
San Juan	104	15,294	6.9%	47.4	$43,491	40.2%	96.9%	11.9%
Walla Walla	79	57,788	7.0%	34.9	$40,005	23.3%	88.6%	16.0%
Whatcom	1,005	196,529	7.2%	34.0	$40,005	27.2%	90.8%	15.4%
County Averages	336	65,386	8.0%	36.8	$37,423	23.8%	84.3%	15.6%
non-LCDM Counties (n=3,668)								
Clallam	43	71,021	9.9%	43.8	$36,449	20.8%	91.4%	13.7%
Clark	1,327	424,733	9.0%	34.2	$48,376	13.0%	91.6%	15.3%
Greys Harbor	449	71,342	13.2%	38.8	$34,160	12.7%	91.2%	15.4%
Mason	186	57,846	10.6%	40.3	$39,586	15.6%	91.2%	14.2%
Pacific	108	21,271	11.6%	45.8	$39,302	15.2%	93.2%	13.7%
Snohomish	779	711,100	7.1%	34.7	$53,060	27.9%	88.6%	15.0%
Spokane	776	462,677	8.9%	35.4	$37,308	25.0%	93.9%	15.4%
County Averages	524	259,999	10.0%	39.0	$41,177	18.6%	91.6%	14.7%

* 2000 US Census Data, compiled by the WA Office of Financial Management

**Data from April 2012, WA Office of Financial Management

Table 2. Independent variables relating to the respondent's exposure to abuse, 2010 Health Youth Survey	
Outcome	**Healthy Youth Survey Question**
Physical Abuse by Adult	Have you been physically abused by an adult?
Witness Abuse by Adult	Not counting TV, movies, video games, and sporting events, have you seen an adult hit, slap, punch, shove, kick, or otherwise physically hurt another adult more than one time?
Threatened by Partner	During the past 12 months, did your boyfriend or girlfriend ever limit your activities, threaten you, or make you feel unsafe in any other way?
Abuse by Partner	During the past 12 months, have you had any injuries such as bruises, cuts, black eyes, or broken bones as a result of being hurt by a boyfriend or girlfriend?

Table 3. Bivariate analysis of select characteristics of adolescents residing in LCDM and non-LCDM counties, Washington, 2010.

Characteristic	10th Grade[a,c] non-LCDM, %	LCDM, %	P-value	12th Grade[a,c] non-LCDM, %	LCDM, %	P-value
Female						
Age, yrs			0.72			0.45
≤15	75	73		0	0	
16	25	27		2	1	
17	0	0		76	74	
18≤	0	0		22	25	
Race/Ethnicity			<0.01			0.01
White, Non-Hispanic	69	57		72	67	
Hispanic	7	21		6	16	
Black	3	1		2	1	
Native American	2	4		2	2	
API	7	3		8	5	
Other	12	14		10	10	
Materal Education			0.46			0.65
Below H.S.	12	16		11	14	
H.S. Graduate	23	22		25	24	
Some College	27	23		33	28	
College Graduate	19	20		16	18	
Beyond College	7	9		7	9	
Don't Know/NA/Missing	12	11		8	8	
Male						
Age			0.05			0.02
≤15	68	60		0	0	
16	31	38		1	3	
17	1	2		69	66	
18≤	0	0		30	31	
Race/Ethnicity			0.01			<0.01
White or Caucasian	67	57		74	63	
Hispanic	8	21		6	19	
African or African-American	4	3		3	3	
Native American	4	3		2	3	
Asian or Pacific Ilander	8	5		7	3	
Other	11	12		9	9	
Materal Education			0.31			0.52
Below H.S.	11	13		11	13	
H.S. Graduate	24	19		24	20	
Some College	24	22		30	28	
College Graduate	21	20		19	21	
Beyond College	7	10		7	10	
Don't Know/NA/Missing	13	16		9	9	

[a] Total sample size for 10th grade: Female=1564; Male=1423

[b] Total sample size for 12th grade: Female=1231; Male=1129

[c] Totals for some variables may differ due to missing values.

Table 4. Stratified unadjusted estimates of self-identified by adolescents living in LCDM and non-LCDM counties, Washington, 2010.

Abuse Exposure		10th Grade[a] non-LCDM, %	LCDM, %	P-value	12th Grade[b] non-LCDM, %	LCDM, %	P-value
Female							
Abuse from Adult							
Abuse by Adult	Yes	19	20	0.44	19	20	0.39
	No	80	79		80	79	
	Missing	1	1		1	1	
Witness Abuse by Adult	Yes	29	28	0.77	26	26	0.33
	No	70	70		73	74	
	Missing	1	2		1	0	
Abuse from Dating Partner							
Threatened by Partner	Yes	10	9	0.46	9	9	0.76
	No	90	91		91	91	
	Missing	0	0		0	0	
Abuse by Partner	Yes	7	6	0.78	6	3	0.02
	No	92	93		93	97	
	Missing	1	1		1	0	
Male							
Abuse from Adult							
Abuse by Adult	Yes	15	16	0.31	17	13	0.19
	No	83	83		82	86	
	Missing	2	1		1	1	
Witness Abuse by Adult	Yes	26	28	0.45	33	27	0.15
	No	72	71		65	72	
	Missing	2	1		2	1	
Abuse from Dating Partner							
Threatened by Partner	Yes	6	7	0.77	9	6	0.16
	No	93	92		90	93	
	Missing	1	1		1	1	
Abuse by Partner	Yes	6	6	0.96	7	6	0.48
	No	92	92		92	93	
	Missing	2	2		1	1	

[a] Total sample size for 10th grade variables: Female=1564; Male=1423

[b] Total sample size for 12th grade variables: Female=1231; Male=1129

Table 5. Fully adjusted estimates for association of county of residence and self-reported abuse, Washington, 2010.

Abuse Exposure		10th grade [a,c] OR[d]	95% CI[e]	p-value	12th grade [b,c] OR[d]	95% CI[e]	p-value
Female							
Abuse by Adult	LCDM	1.1	[0.86, 1.42]	0.43	1.1	[0.82, 1.38]	0.63
	non-LCDM (ref)						
Witness Abuse by Adult	LCDM	0.98	[0.72, 1.33]	0.91	0.94	[0.74, 1.19]	0.58
	non-LCDM (ref)						
Threatened by Partner	LCDM	0.83	[0.56, 1.22]	0.34	0.93	[0.59, 1.46]	0.72
	non-LCDM (ref)						
Abuse by Partner	LCDM	0.96	[0.62, 1.51]	0.87	0.45	[0.25, 0.80]	0.01
	non-LCDM (ref)						
Male							
Abuse by Adult	LCDM	1.1	[0.82, 1.53]	0.47	0.72	[0.51, 1.02]	0.07
	non-LCDM (ref)						
Witness Abuse by Adult	LCDM	1.1	[0.85, 1.45]	0.45	0.7	[0.48, 1.03]	0.07
	non-LCDM (ref)						
Threatened by Partner	LCDM	1.1	[0.68, 1.77]	0.7	0.6	[0.37, 0.96]	0.04
	non-LCDM (ref)						
Abuse by Partner	LCDM	0.87	[0.52, 1.46]	0.59	0.83	[0.51, 1.35]	0.44
	non-LCDM (ref)						

[a] Total sample size for 10th grade: Female=1564; Male=1423

[b] Total sample size for 12th grade: Female=1231; Male=1129

[c] Totals for some variables may differ due to missing values.

[d] OR = odds ratio

[e] CI = confidence interval

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