

Long-Term Consequences of Adolescent Gang Membership for Adult Functioning

Amanda B. Gilman, MSW, Karl G. Hill, PhD, and J. David Hawkins, PhD

Research has consistently shown that gang membership has proximal adverse consequences during adolescence that, in turn, lead to significant social and economic costs.¹⁻³ Active gang members are much more likely than their nongang peers to engage in criminal behavior,^{2,4,5} especially serious and violent offending⁶; in addition, they are more likely to be involved in drug use and selling,⁵ have more difficulties in school,⁴ and are more likely to be violently victimized.³ However, with few exceptions, there is scant research on possible broader, long-term public health consequences of gang membership.⁷⁻⁹

Levitt and Vankatesh,⁸ in a 10-year follow-up of a sample of Chicago youths, found that those who reported being in a gang during adolescence were more likely to be arrested and incarcerated as adults, were more likely to rely on illegal income, and had obtained less formal education than their nongang peers. When they controlled for background characteristics such as home environment and early school performance, only the relationship between adolescent gang membership and illegal income in adulthood remained significant.

In an ethnographic study, Hagedorn¹⁰ conducted follow-up interviews of 228 Milwaukee-based founding male gang members several years after his initial study. Two thirds of the sample did not have a high school diploma or general equivalency diploma (GED), fewer than 32% were employed, and more than 63% had been incarcerated.

In a quantitative study involving a community sample, Thornberry et al.⁹ examined the extent to which gang membership negatively affected the timeliness of developmental transitions into adulthood, such as completion of schooling and establishment of a career. They found that, after control for individual and environmental risks, male respondents who had been short-term or long-term gang members in adolescence had a greater likelihood of cohabitation before marriage at the age of

Objectives. We examined the possible public health consequences of adolescent gang membership for adult functioning.

Methods. Data were drawn from the Seattle Social Development Project, a longitudinal study focusing on the development of positive and problem outcomes. Using propensity score matching and logistic regression analyses, we assessed the effects of adolescent gang membership on illegal behavior, educational and occupational attainment, and physical and mental health at the ages of 27, 30, and 33 years.

Results. In comparison with their nongang peers, who had been matched on 23 confounding risk variables known to be related to selection into gang membership, those who had joined a gang in adolescence had poorer outcomes in multiple areas of adult functioning, including higher rates of self-reported crime, receipt of illegal income, incarceration, drug abuse or dependence, poor general health, and welfare receipt and lower rates of high school graduation.

Conclusions. The finding that adolescent gang membership has significant consequences in adulthood beyond criminal behavior indicates the public health importance of the development of effective gang prevention programs. (*Am J Public Health.* 2014;104:938-945. doi:10.2105/AJPH.2013.301821)

22 years than male respondents who had not been gang members. Long-term gang members also had significantly higher rates of unstable employment, school dropout, early pregnancy, and teenage parenthood at the follow-up. Female gang members were more likely to experience untimely or problematic transitions, including unstable employment, teenage pregnancy, and early motherhood. Both male and female former gang members were more likely to report adult arrests.

Recently, Krohn et al.¹¹ found that there was an indirect positive relationship between adolescent gang membership and engagement in street crime and arrest in adulthood. Specifically, gang membership was related to precocious transitions into adulthood that then predicted disrupted family relationships and economic instability. They found that this path eventually led to criminal behaviors at the age of 30 years. In our study, we extended these investigations by assessing the effects of gang membership on adult functioning holistically, examining possible later adult outcomes.

Life course theory¹²⁻¹⁴ provides a framework to understand how gang membership in adolescence may affect illegal behavior, educational and occupational attainment, and physical and mental health in adulthood. This theory emphasizes the strong connection between childhood events and experiences in adulthood (trajectories), as well as significant events that create a disruption in a trajectory (turning points). Although we did not directly test a trajectory change model in this study, life course theory would suggest that joining a gang during adolescence may initiate a negative developmental cascade into both criminal and noncriminal domains, including decreased educational and occupational attainment and poor physical and mental health.^{15,16} Indeed, Melde and Esbensen reported that “youth who join gangs experience noteworthy changes in their emotions, attitudes, and behavior,”^{17(p539)} suggesting that gang membership may serve as a significant turning point in an individual’s life course.

One such life course theory, the social development model,¹⁸ provides specific mechanisms

through which these consequences may operate. This model articulates the mechanisms of socialization and identifies parallel but separate causal paths for prosocial and antisocial processes consisting of opportunities for involvement, actual involvement, skills, rewards, bonding, and adoption of beliefs. Participation in the prosocial path is seen to increase subsequent positive outcomes and decrease risk behaviors. By contrast, participation in the antisocial path is seen to decrease positive outcomes and increase problem behaviors. From the perspective of this model, gang membership in adolescence may serve as a turning point, drastically changing the opportunity structure for young people. As gang-involved youths move through subsequent cycles of socialization, they are likely to experience reduced prosocial functioning across several domains and escalated problem behaviors as they transition into adulthood, even if they are no longer members of a gang.

According to Krohn and Thornberry,

it is reasonable to expect that being a member of a gang during adolescence will be associated with disrupted transitions from adolescence to adulthood and, ultimately, will adversely impact life chances.^{7(p149)}

They noted that the challenge is to discover empirically to what extent gang membership contributes to negative outcomes in adulthood over and above general delinquency and other risk factors in adolescence. This was precisely the aim of our study.

METHODS

We used longitudinal data from the Seattle Social Development Project (SSDP), which includes a multiethnic sample of 808 fifth-grade students who in 1985 were attending 18 elementary schools serving high-crime neighborhoods of Seattle. Participants have been followed prospectively into adulthood. Of the 808 students, 396 (49%) were female, 381 (47.2%) were White, 207 (25.6%) were African American, 177 (21.9%) were Asian American, and 43 (5.3%) were Native American. Of the total sample, about 5% self-identified as Hispanic. More than half of the sample (52%) had participated in free or reduced-price school lunch programs at some point in the fifth, sixth, or seventh grade, indicating that they came from low-income families.

Data were obtained from multiple sources, including the youths, their parents or adult caretakers, teachers, and school records. Survey data were first collected in 1985, when most of the participants were 10 years of age (mean = 10.3, SD = 0.52); data were then collected in the spring of each year through 10th grade and again in 12th grade. As adults, the participants have been interviewed every 3 years. Outcomes were assessed at the ages of 27, 30, and 33 years (retention rates at these follow-up points were 95%, 93%, and 92%, respectively).

Measures

Gang membership. Gang membership was measured prospectively from ages 13 to 18 years with the question “Do you belong to a gang?” followed by “What is the name of the gang?” (to distinguish gangs from informal peer groups). In addition, the survey administered in adulthood included a retrospective gang membership item (“Have you ever belonged to a gang?”). There were some inconsistencies in reporting across time. Sensitivity analyses revealed that those who ever reported that they had joined a gang, even if they responded negatively at a different time, were more similar to those who consistently reported being in a gang than those who were never in a gang with respect to demographic and risk factors. Therefore, respondents were classified as having joined a gang (and assigned a code of 1) if they ever reported having done so, either prospectively or retrospectively. This approach yielded a value of gang membership (a code of 0 or 1) for all study respondents.

Control variables. We used 23 control variables (as shown in Table 1), identified both empirically and theoretically as influencing self-selection into gangs, to calculate propensity scores and match the gang and nongang groups. Included were 21 variables in 5 domains (individual, family, school, peer, and neighborhood) that have consistently been shown in this sample and others to be predictive of gang membership,^{19–23} as well as demographic variables also known to be related to gang membership. All control variables were measured as an average of the fifth- and sixth-grade responses, before the age of gang membership onset for the majority of those who joined (see Hill et al.²¹ for a full description

of how each of these variables was operationalized).

We included an additional control for each of the models predicting general health, depression, and anxiety to further ensure that any observed relationships between gang membership and these adult outcomes were not caused by the presence of the outcome variables (i.e., health, depression, anxiety) prior to gang involvement. For each of the other outcomes (e.g., illegal behavior, educational achievement, substance use), pre-gang levels of these variables (or close proxies) were included in the propensity score given that they were hypothesized to predict selection into adolescent gang membership. However, the same was not true for general health, depression, and anxiety. Therefore, the model predicting poor general health in adulthood included a retrospective assessment of lifetime poor health, measured at the age of 21 years, as an additional control. Individuals who answered yes to the question “Would you say you have been sickly a large part of your life?” were assigned a code of 1, and all other responses were coded as 0. Early levels of anxiety and depression (measured in fifth grade) were assessed with items from the Teacher Report Form of the Child Behavior Checklist.²⁴

Adult outcomes. We investigated outcomes in 3 broad domains relevant to public health (assessed in 2002, 2005, and 2008, when respondents were aged 27, 30, and 33 years, respectively): illegal behavior, educational and occupational attainment, and physical and mental health. If respondents endorsed an outcome at age 27, 30, or 33 years, they were assigned a code of 1; otherwise, they were assigned a code of 0.

With respect to illegal behavior, self-reported crime was a measure of whether the participant reported committing at least one property or violent offense in the preceding year at age 27, 30, or 33 years. Receipt of illegal income was a measure of whether respondents reported receiving income from drug sales or other illegal activity in the preceding year (coded as 1) or did not report receiving such income (coded as 0). Similarly, incarceration was assessed by asking individuals whether they had spent any time in jail or prison in the preceding year (affirmative responses were coded as 1, and all other responses were coded as 0).

TABLE 1—Covariate Distributions for Gang vs Nongang Members, Measured at Ages 10–12 Years, Before and After Propensity Score Matching: Seattle Social Development Project, Washington, 1985–2008

Variables	Before Matching (n = 808)			After Matching (n = 346)		
	%	Mean (SE)	P	%	Mean (SE)	P
Demographic characteristics						
Male gender			<.01			.96
Gang	76			76		
Nongang	44			74		
Race/ethnicity						
White			<.01			.63
Gang	29			29		
Nongang	52			33		
African American			<.01			.52
Gang	42			42		
Nongang	21			36		
Native American			.01			.73
Gang	9			9		
Nongang	4			10		
Asian American			.42			.68
Gang	20			20		
Nongang	23			21		
Neighborhood factors						
Availability of marijuana			<.01			.86
Gang		1.99 (0.07)			1.99 (0.07)	
Nongang		1.55 (0.03)			1.95 (0.08)	
Neighborhood kids in trouble			<.01			.77
Gang		0.52 (0.04)			0.52 (0.04)	
Nongang		0.25 (0.02)			0.51 (0.04)	
Low neighborhood attachment			.06			.74
Gang		1.88 (0.05)			1.88 (0.05)	
Nongang		1.78 (0.02)			1.92 (0.06)	
Family factors						
Poverty ^a			<.01			.89
Gang		0.32 (0.06)			0.32 (0.06)	
Nongang		-0.06 (0.03)			0.31 (0.07)	
Family structure						
Two biological or adoptive parents			<.01			.22
Gang	31			31		
Nongang	50			33		
One biological parent and one stepparent			.54			.99
Gang	11			11		
Nongang	13			10		
One parent only			.04			.94
Gang	32			32		
Nongang	22			35		
One parent and other adults			<.01			.72
Gang	13			13		
Nongang	7			12		

Continued

High school graduation (not including GED) was self-reported and coded as 1 (and coded as 0 otherwise). We chose to exclude GED as an indicator of high school graduation because research has shown that those who graduate from high school have significantly better life outcomes than those who take an equivalency exam.²⁵ Welfare receipt was a measure of receipt of public assistance (coded as 1) in the past year at age 27, 30, or 33 years.

We used a self-reported measure of general health. This variable was dichotomized into excellent or good health (coded as 0) and fair or poor health (coded as 1) at ages 27, 30, and 33 years. Mental health was assessed with variables indicating whether participants met the criteria of the *Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition*²⁶ (DSM-IV) for major depression or generalized anxiety disorder (coded as 1 if yes and 0 otherwise) at age 27, 30, or 33 years. Similarly, participants were asked a series of questions about their alcohol and drug use. Participants were assigned a code of 1 if, during the preceding year, they met DSM-IV²⁶ criteria for either alcohol abuse or dependence at age 27, 30, or 33 years, and they were assigned a code of 0 if they did not meet these criteria. The same coding scheme was used for drug abuse or dependence.

Data Analysis

Our goal was to determine whether there are unique long-term consequences of adolescent gang membership for adult functioning over and above the effects of early childhood risk factors associated with self-selection into the gang lifestyle. One of the greatest challenges researchers face when examining the effects of a “treatment” received by a group (e.g., gang membership) is to adequately control for all of the confounding variables that might influence self-selection into the treatment group. Yanovitzky et al.²⁷ noted that, in the absence of a randomized controlled trial, one of the most effective approaches to addressing this selection bias is the use of a propensity score analysis.²⁸ Thus, we used propensity score matching to ensure that the only variable that distinguished the treatment group (i.e., those who had joined a gang in adolescence) from the control group was gang membership itself. The psmatch2²⁹ module

TABLE 1—Continued

No parents in home		.03		.59
Gang	13		13	
Nongang	8		10	
Sibling antisocial behavior		.01		.38
Gang	0.14 (0.02)		0.14 (0.02)	
Nongang	0.10 (0.01)		0.15 (0.02)	
Poor family management		.06		.91
Gang	1.63 (0.04)		1.63 (0.04)	
Nongang	1.56 (0.02)		1.64 (0.04)	
Parent proviolent attitudes		<.01		.84
Gang	1.25 (0.04)		1.25 (0.04)	
Nongang	1.12 (0.01)		1.25 (0.04)	
School factors				
Low academic aspirations		<.01		.9
Gang	2.08 (0.06)		2.08 (0.06)	
Nongang	1.86 (0.03)		2.04 (0.07)	
Low school commitment		<.01		.77
Gang	2.48 (0.05)		2.48 (0.05)	
Nongang	2.22 (0.02)		2.46 (0.05)	
Low school attachment		.09		.99
Gang	2.07 (0.05)		2.07 (0.05)	
Nongang	1.98 (0.02)		2.08 (0.06)	
Academic achievement ^b		<.01		.88
Gang	497 (3.6)		497 (3.6)	
Nongang	523 (1.9)		502 (3.8)	
Learning disability		<.01		.6
Gang	19		19	
Nongang	7		15	
Peer factors				
Association with friends who engage in problem behaviors		<.01		.63
Gang	1.07 (0.09)		1.07 (0.09)	
Nongang	0.70 (0.04)		0.97 (0.09)	
Individual factors				
Antisocial beliefs		<.01		.8
Gang	1.51 (0.04)		1.51 (0.04)	
Nongang	1.37 (0.02)		1.51 (0.05)	
Alcohol use		.07		.97
Gang	0.63 (0.06)		0.63 (0.06)	
Nongang	0.53 (0.03)		0.65 (0.07)	
Marijuana initiation		<.01		.75
Gang	14		14	
Nongang	6		12	
Violent behavior		<.01		.7
Gang	1.23 (0.04)		1.23 (0.04)	
Nongang	0.93 (0.02)		1.18 (0.05)	
Externalizing behavior		<.01		.48
Gang	0.39 (0.03)		0.39 (0.03)	
Nongang	0.20 (0.01)		0.34 (0.03)	

Continued

in Stata (StataCorp LP, College Station, TX) was used in conducting our analyses.

First, we used multiple imputation to account for missing data in the sample. All variables used in the analyses were included in the multiple imputation model. The average rate of missing data across all variables was 5.2% (the variables with the highest percentages of missing data were poor refusal skills and family structure, which were part of the 23-item propensity score).

Second, we calculated a propensity score, which can be described as the conditional probability of receiving the “treatment” in each of the 40 imputed data sets for the entire sample according to our 23 control variables. A nearest neighbor without replacement matching strategy was used to match the 173 participants who had joined a gang in adolescence with 173 participants who had never joined a gang but showed a similar propensity for doing so. Only these 346 individuals were included in subsequent analyses. We tried several matching strategies and selected this approach because it optimized balance and statistical power while sufficiently reducing bias. An important advantage of propensity score analyses over multivariate regression analyses is the ability to ensure that the 2 comparison groups are adequately balanced. That is, in our propensity score analysis, we were able to show that there were no statistically significant differences between the 2 groups on any of the 23 control variables included (Table 1).

Finally, a series of logistic regression models were estimated in which those who had joined a gang were compared with those who had not on several measures of adult functioning. As recommended by Graham,³⁰ results from the imputed data set were combined to estimate unbiased parameters and standard errors. Our hypotheses were that gang membership in adolescence would predict higher rates of illegal behavior, lower educational and occupational attainment, and poorer physical and mental health in adulthood.

RESULTS

Within the SSDP sample, 21.4% of the respondents (n = 173) reported ever having joined a gang. The average age at which

TABLE 1—Continued

Hyperactivity		<.01	.87
Gang	0.88 (0.04)		0.88 (0.04)
Nongang	0.66 (0.02)		0.83 (0.05)
Poor refusal skills		<.01	.87
Gang	2.28 (0.07)		2.28 (0.07)
Nongang	2.09 (0.04)		2.27 (0.08)

^aStandardized composite variable.

^bAs determined by the California Achievement Test score.

respondents had joined a gang was 14.9 years. No individual reported joining a gang after the age of 19 years (Figure 1). Prevalence rates and means for each of the control variables among gang and nongang respondents both before and after propensity score matching are shown in Table 1.

Nationwide, a disproportionate number of gang members are male and members of ethnic minority groups.³¹ This disproportionality was also reflected in the SSDP data. Almost 42% of the gang members in this sample were African American. By contrast, only 21% of those who had never joined a gang were African American (Table 1). Twenty-nine percent of those who had joined a gang were White, 20% were Asian American, and 9% were Native American. Nearly 76% of those

who joined were male, while only 44% of those who had never joined were male. All control variables were related to gang membership in the expected direction at the $P = .1$ level. After matching, there were no statistically significant differences (at the $P = .05$ level) between groups according to race/ethnicity, gender, or any of the other 21 variables used to calculate the propensity score (Table 1).

An additional criterion for assessing balance between matched samples is to calculate the standardized mean differences between the groups. Austin reported that “there is no threshold for standardized differences that has been uniformly accepted as indicative of meaningful imbalance,”^{32(p1210)} but some researchers claim that a difference of less than 10% indicates a significant reduction in

bias.^{27,33} After matching, only 4 of the 23 variables showed differences above 10% (absolute values ranged from 10.27% to 12.50%). Because these differences were low (most were well under the recommended threshold) and were not statistically significant, we believed that we had established an adequate control group.³⁴

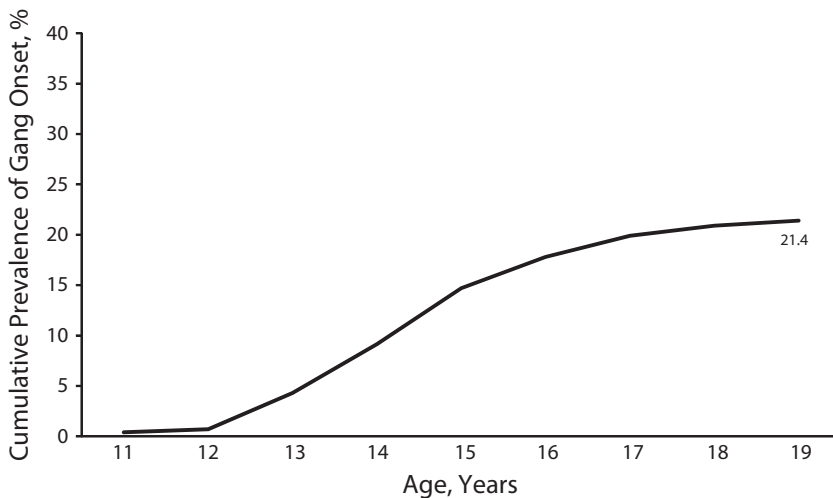
Bivariate prematching associations (Table 2, first column) revealed that adolescent gang membership significantly predicted poorer functioning across all 3 domains in adulthood at the zero-order level: risk taking and illegal behavior (including self-reported crime, receipt of illegal income, and incarceration), educational and occupational attainment (including high school graduation and welfare receipt), and physical and mental health (including general health, alcohol abuse or dependence, and drug abuse or dependence). The remaining 2 indicators of adult functioning (anxiety and depression) were elevated among those who joined a gang in adolescence relative to nongang members, but the differences did not achieve statistical significance. The second column of Table 2 shows the results from logistic regressions estimated with the matched samples.

Illegal Behavior

Adolescent gang membership significantly predicted self-reported crime, receipt of illegal income, and incarceration even after controlling for salient risk factors via propensity score matching. Specifically, in comparison with those who had never joined a gang, those who reported joining a gang in adolescence were (at age 27, 30, or 33 years) nearly 3 times as likely to report committing a crime in the preceding year, 3.66 times more likely to report receiving income from illegal sources, and 2.37 times more likely to have spent time incarcerated in the preceding year.

Educational and Occupational Attainment

Adolescent gang membership significantly predicted lower rates of high school graduation; those who had joined a gang in adolescence were about half as likely to graduate from high school as those who had never joined a gang but shared similar risk backgrounds. The association with welfare receipt



Note. No gang members reported joining a gang after the age of 19 years. However, at ages 21, 24, 27, 30, and 33 years, rates of continued gang membership were approximately 3%, 3%, 2%, 1%, and 1%, respectively.

FIGURE 1—Cumulative gang membership onset through age 19 years: Seattle Social Development Project, Washington, 1985–2008.

TABLE 2—Results of Logistic Regression Analyses Assessing Whether Adolescent Gang Membership Predicts Adult Functioning at Ages 27–33 Years: Seattle Social Development Project, Washington, 1985–2008

Variables	Before Matching (n = 808), OR (95% CI)	After Matching (n = 346), OR (95% CI)
Illegal behavior		
Self-reported crime	4.63*** (3.23, 6.65)	2.94*** (1.83, 4.73)
Receipt of illegal income	7.66*** (4.15, 14.15)	3.66*** (1.67, 8.01)
Incarceration	7.32*** (4.54, 11.87)	2.37** (1.37, 4.09)
Educational and occupational attainment		
High school graduation	0.28*** (0.19, 0.42)	0.58* (0.35, 0.97)
Welfare receipt	2.12*** (1.43, 3.12)	1.69* (0.99, 2.90)
Health and mental health		
Poor general health ^a	1.86*** (1.31, 2.64)	1.72* (1.08, 2.76)
Depression ^a	1.45 (0.97, 2.17)	1.43 (0.50, 5.67)
Anxiety ^a	1.36 (0.83, 2.23)	1.33 (0.69, 2.58)
Alcohol abuse or dependence	1.68** (1.17, 2.41)	1.13 (0.71, 1.79)
Drug abuse or dependence	3.81*** (2.51, 5.77)	2.77*** (1.55, 4.94)

Note. CI = confidence interval; OR = odds ratio.

^aModel also includes control for early, pregang level of the adult outcome.

* $P \leq .05$; ** $P \leq .01$; *** $P \leq .001$.

was also marginally significant ($P = .05$). Those who joined a gang were about 1.7 times more likely to be receiving public assistance in adulthood.

Physical and Mental Health

Finally, adolescent gang membership predicted poorer health and mental health in adulthood. Specifically, those who had joined a gang in adolescence were about 1.7 times more likely to report poor health at age 27, 30, or 33 years than those who had never joined a gang. They were also nearly 3 times more likely to meet the criteria for drug abuse or dependence in the preceding year.

Continued Gang Membership in Adulthood

Gang membership was largely an adolescent phenomenon (Figure 1). Sensitivity analyses examining whether the 17 respondents who reported current gang membership at the age of 27 years differed from those who had left gangs revealed comparable patterns of responses in the 2 groups, with one exception. Analyses excluding the 17 current gang members showed that the relationship between adolescent gang membership and educational

attainment was no longer statistically significant.

DISCUSSION

Our analyses show that adolescent gang membership has a significant impact on adult functioning across all 3 of the domains examined in this study. These effects remained even after controlling for individual, family, peer, school, and neighborhood characteristics. Certain outcomes, including a higher propensity for illegal behaviors as well as lower rates of educational and occupational attainment, are not surprising given the well-established relationship between gang membership and criminal behavior and lower involvement in conventional institutions. However, less expected is the significant relationship between adolescent gang membership and poor physical and mental health in adulthood. In fact, the results of this study confirm the assertions of life course theory and the idea of developmental cascades discussed earlier. Our analyses elucidate the role that gang membership may play in propelling youths down a path resulting in negative consequences that appear to “cascade” into 3 broad areas of adult functioning.

Our study is not the first to highlight a relationship between antisocial behavior and poor health outcomes.^{35–38} This link is probably a result of higher rates of risk taking in addition to lower rates of activities that promote better health among those who engage in antisocial behavior.³⁹ Our analyses indicate that adolescent gang membership predicts a stressful and risky life course well into early adulthood. Future etiological research should focus on whether such outcomes vary according to sociodemographic characteristics (e.g., race/ethnicity and gender), as well as whether individual, family, peer, school, and neighborhood risks contribute to these outcomes independently of or in interaction with gang membership.

Study Limitations

Our data were derived from a Seattle community sample of young people who were adolescents in the 1980s and early 1990s. Caution should be applied when generalizing our results to other geographic areas. Each community and, indeed, each gang has its own distinct set of variables that may affect long-term consequences. Given the life course theory framework described earlier, however, we believe these processes to be general and find no reason to expect that the relationships between gang membership and adult functioning reported here would differ dramatically in other places.

It also should be noted that our data were self-reported. It is possible that gang membership itself was underreported or overreported in our sample. However, self-reported data have been used extensively in gang studies to determine gang membership,^{14,40–46} and Esbensen et al.⁴⁷ determined that self-identification is a highly reliable indicator of gang membership.

Implications for Public Health

To help communities engage in prevention activities effectively, it is important to understand the role joining a gang may play in affecting an adolescent's life course. Indeed, as early as 1993, when the discipline of prevention science was only beginning to gain national attention, Coie et al.^{48(p1017)} noted the need for life course models that “extend their sights beyond the acute onset of disorder

and take account of the whole life cycle, working backward and forward from the initial clinical outcome.^{32(p1210)} Researchers and the lay community often consider gang membership only in the context of adolescence and, frequently, only in terms of involvement in crime and delinquency. We have found that adolescent gang membership has long-term consequences that extend beyond criminal activity, indicating that gang membership may have implications for public health beyond public safety.

Our findings suggest that effective gang prevention efforts may result not only in reductions in adolescent problem behavior but also in higher adult functioning across multiple domains. It is our hope that the results of this study will provide motivation for prevention scientists to develop, implement, and test effective programs to prevent young people from joining gangs. ■

About the Authors

The authors are with the Social Development Research Group, School of Social Work, University of Washington, Seattle.

Correspondence should be sent to Amanda B. Gilman, MSW, PhD Candidate, Social Development Research Group, University of Washington, 9725 3rd Ave NE, Suite 401, Seattle, WA 98115 (e-mail: abg5@uw.edu). Reprints can be ordered at <http://www.ajph.org> by clicking on the "Reprints" link.

This article was accepted November 25, 2013.

Contributors

A. B. Gilman developed the research question, conducted the analyses, and led the writing of the article. K. G. Hill and J. D. Hawkins contributed to study conceptualization, data collection, and the writing of the article.

Acknowledgments

This project was supported by the National Institute on Drug Abuse (grants R01DA003721, R01DA009679, and R01DA024411-03-04), the Robert Wood Johnson Foundation (grant 21548), and the National Institute of Mental Health (grant 5 T32 MH20010).

We are grateful to the anonymous reviewers as well as the editor for their valuable comments on this article. We also thank the members of the Seattle Social Development Project (SSDP) analysis team for their input on substantive and methodological issues and the data collection and data management teams for their tireless work. Finally, we thank the SSDP respondents, whose continued participation makes this research possible.

Note. The content of this article is solely the responsibility of the authors and does not necessarily represent the official views of the funding agencies.

Human Participant Protection

All of the study procedures were approved by the University of Washington institutional review board.

Written informed consent was obtained from all study participants.

References

- Dukes RL, Martinez RO, Stein JA. Precursors and consequences of membership in youth gangs. *Youth Soc*. 1997;29(2):139–165.
- Howell JC. *The Impact of Gangs on Communities*. Washington, DC: US Department of Justice, Office of Juvenile Justice and Delinquency Prevention; 2006.
- Peterson D, Taylor T, Esbensen F-A. Gang membership and violent victimization. *Justice Q*. 2004;21(4):793–815.
- Decker SH, Van Winkle B. *Life in the Gang: Family, Friends and Violence*. Cambridge, UK: Cambridge University Press; 1996.
- Hill KG, Lui C, Hawkins JD. Early precursors of gang membership: a study of Seattle youth. Available at: <https://www.ncjrs.gov/pdffiles1/ojdp/190106.pdf>. Accessed January 6, 2014.
- Huff CR. *Comparing the Criminal Behavior of Youth Gangs and At-Risk Youths*. Washington, DC: US Department of Justice, National Institute of Justice; 1998.
- Krohn MD, Thornberry TP. Longitudinal perspectives on adolescent street gangs. In: Liberman A, ed. *The Long View of Crime: A Synthesis of Longitudinal Research*. New York, NY: Springer; 2008:128–160.
- Levitt SD, Vankatesh SA. *An Analysis of the Long-Run Consequences of Gang Involvement*. Cambridge, MA: Harvard University; 2001.
- Thornberry TP, Krohn MD, Lizotte AJ, Smith CA, Tobin K. *Gangs and Delinquency in Developmental Perspective*. Cambridge, UK: Cambridge University Press; 2003.
- Hagedorn J. *People and Folks: Gangs, Crime, and the Underclass in a Rustbelt City*, 2nd ed. Chicago, IL: Lake View Press; 1998.
- Krohn MD, Ward JT, Thornberry TP, Lizotte AJ, Chu R. The cascading effects of adolescent gang involvement across the life course. *Criminology*. 2011; 49(4):991–1028.
- Elder GH. Perspectives on the life course. In: Elder GH, ed. *Life Course Dynamics: Trajectories and Transitions, 1968–1980*. Ithaca, NY: Cornell University Press; 1985:23–49.
- Gotlib IH, Wheaton B. Trajectories and turning points over the life course: concepts and themes. In: Gotlib IH, Wheaton B, eds. *Stress and Adversity Over the Life Course: Trajectories and Turning Points*. Cambridge, UK: Cambridge University Press; 1997:1–25.
- Sampson RJ, Laub JH. Crime and deviance in the life course. *Annu Rev Sociol*. 1992;18:63–84.
- Masten AS, Cicchetti D. Developmental cascades. *Dev Psychopathol*. 2010;22(3):491–495.
- McLeod JD, Almazan EP. Connections between childhood and adulthood. In: Mortimer JT, Shanahan MJ, eds. *Handbook of the Life Course*. New York, NY: Springer; 2003:391–411.
- Melde C, Esbensen F-A. Gang membership as a turning point in the life course. *Criminology*. 2011; 49(2):513–552.
- Catalano RF, Hawkins JD. The social development model: a theory of antisocial behavior. In: Hawkins JD, ed. *Delinquency and Crime: Current Theories*. New York, NY: Cambridge University Press; 1996:149–197.
- Dishion TJ, Veronneau MH, Myers MW. Cascading peer dynamics underlying the progression from problem behavior to violence in early to late adolescence. *Dev Psychopathol*. 2010;22(3):603–619.
- Esbensen F-A, Huizinga D. Gangs, drugs, and delinquency in a survey of urban youth. *Criminology*. 1993;31(4):565–589.
- Hill KG, Howell JC, Hawkins JD, Battin Pearson SR. Childhood risk factors for adolescent gang membership: results from the Seattle Social Development Project. *J Res Crime Delinq*. 1999;36(3):300–322.
- Huizinga D, Weiher AW, Espiritu R, Esbensen FA. Delinquency and crime: some highlights from the Denver Youth Survey. In: Thornberry TP, Krohn MD, eds. *Taking Stock of Delinquency: An Overview of Findings From Contemporary Longitudinal Studies*. New York, NY: Kluwer Academic/Plenum Publishers; 2003:47–91.
- Lacourse E, Nagin DS, Vitaro F, Cote S, Arseneault L, Tremblay RE. Prediction of early-onset deviant peer group affiliation: a 12-year longitudinal study. *Arch Gen Psychiatry*. 2006;63(5):562–568.
- Achenbach TM, Edelbrock C. *Manual for the Child Behavior Checklist and Revised Child Behavior Profile*. Burlington, VT: University of Vermont Press; 1983.
- Cameron SV, Heckman JJ. The nonequivalence of high school equivalents. *J Labor Econ*. 1993;11(1):1–47.
- Diagnostic and Statistical Manual of Mental Disorders, 4th edition*. Washington, DC: American Psychiatric Association; 1994.
- Yanovitzky I, Hornik R, Zanutto E. Estimating causal effects in observational studies: the propensity score approach. In: Hayes AF, Slater MD, Snyder LB, eds. *The Sage Sourcebook of Advanced Data Analysis Methods for Communication*. Los Angeles, CA: Sage Publications; 2008:159–184.
- Rosenbaum PR, Rubin DB. The central role of the propensity score in observational studies for causal effects. *Biometrika*. 1983;70(1):41–55.
- Leuven E, Sianesi B. PSMATCH2: Stata Module to Perform Full Mahalanobis and Propensity Score Matching, Common Support Graphing, and Covariate Imbalance Testing. Chestnut Hill, MA: Boston College Department of Economics; 2003.
- Graham JW. Missing data analysis: making it work in the real world. *Annu Rev Psychol*. 2009;60:549–576.
- National Gang Center. National Youth Gang Survey analysis. Available at: <http://www.nationalgangcenter.gov/Survey-Analysis>. Accessed January 6, 2014.
- Austin PC. Goodness-of-fit diagnostics for the propensity score model when estimating treatment effects using covariate adjustment with the propensity score. *Pharmacoepidemiol Drug Saf*. 2008;17(12):1202–1217.
- Normand ST, Landrum NB, Guadagnoli E, et al. Validating recommendations for coronary angiography following acute myocardial infarction in the elderly: a matched analysis using propensity scores. *J Clin Epidemiol*. 2001;54(4):387–398.
- Riou Franca L, Payet S, Le Lay K, Launois R. Drotrecogin alfa's impact on intensive care workload in real life practice: a propensity score approach. *Value Health*. 2008;11(7):1051–1060.
- Piquero AR, Daigle LE, Gibson C, Piquero NL, Tibbetts SG. Are life-course-persistent offenders at risk for adverse health outcomes? *J Res Crime Delinq*. 2007;44(2):185–207.

36. Bardone AM, Moffitt TE, Caspi A, Dickson N, Stanton WR, Silva PA. Adult physical health outcomes of adolescent girls with conduct disorder, depression, and anxiety. *J Am Acad Child Adolesc Psychiatry*. 1998; 37(6):594–601.
37. De Genna NM, Stack DM, Serbin LA, Ledingham JE, Schwartzman AE. From risky behavior to health risk: continuity across two generations. *J Dev Behav Pediatr*. 2006;27(4):297–309.
38. Shepherd J, Farrington D. The impact of antisocial lifestyle on health: family, school, and police interventions can reduce health risks. *BMJ*. 2003;326 (7394):834–835.
39. Odgers CL, Robins SJ, Russell MA. Morbidity and mortality risk among the “forgotten few”: why are girls in the justice system in such poor health? *Law Hum Behav*. 2009;34(6):429–444.
40. Bjerregaard B, Smith C. Gender differences in gang participation, delinquency, and substance use. *J Quant Criminol*. 1993;9(4):329–355.
41. Esbensen F-A, Huizinga D, Weiher AW. Gang and non-gang youth: differences in explanatory factors. *J Contemp Crim Justice*. 1993;9(2):94–116.
42. Hindelang MJ, Hirschi T, Weis JG. *Measuring Delinquency*. Beverly Hills, CA: Sage Publications; 1981.
43. Klein M. *The American Street Gang: Its Nature, Prevalence, and Control*. New York, NY: Oxford University Press; 1995.
44. Savitz L, Rosen L, Lalli M. Delinquency and gang membership as related to victimization. *Victimology*. 1980;5(2–4):152–160.
45. Sullivan ML. Are “gang” studies dangerous? Youth violence, local context, and the problem of reification. In: Short JF, Hughes LA, eds. *Studying Youth Gangs*. Lanham, MD: AltaMira Press; 2006:15–35.
46. Thornberry TP, Krohn MD, Lizotte AJ, Chard-Wierschem D. The role of juvenile gangs in facilitating delinquent behavior. *J Res Crime Delinq*. 1993;30(1): 55–87.
47. Esbensen F-A, Peterson D, Taylor TJ, Freng A. *Youth Violence: Sex and Race Differences in Offending, Victimization, and Gang Membership*. Philadelphia, PA: Temple University Press; 2010.
48. Coie JD, Watt NF, West SG. . The science of prevention: a conceptual framework and some directions for a national research program. *Am Psychol*. 1993; 48(10):1013–1022.