BAD MEDICINE

The Relationship Between Gang Membership, Depression, Self-Esteem, and Suicidal Behavior

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Research on the risk factors associated with gang joining suggests that the best predictor of gang membership is the accumulation of risk factors across a number of domains. These same risk factors are also associated with poor mental health and suicide, suggesting that gang members may be at risk for these outcomes. The current study utilized a nationally representative sample to examine two related issues. First, do youth who later become gang involved report levels of self-esteem, depression, suicidal thoughts, and attempted suicide that are substantively different than the general population? Second, how does gang membership affect these indicators of mental health? Results suggest that youth who become gang involved have significantly higher levels of depression and report a substantively higher rate of suicidal thoughts and behaviors than comparison youth. Furthermore, membership in gangs exacerbates these underlying problems, creating higher levels of depression and a higher prevalence of suicidal thoughts and actions.

Keywords: gang membership; depression; self-esteem; suicidal behavior

Research on risk factors for joining a gang suggests that part of the motivation for joining a gang for many youth stems from a general dissatisfaction with their lives and a desire to use the gang as a solution for this discontent. Such frustrations are endemic in adolescence, but most youth, even in areas where gang membership is a viable option, choose not to associate themselves with gangs. Yablonsky (1963) made the same observation more than 50 years ago when he asked, "Why certain boys 'join' violent gangs and

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many others, with the same opportunity, do not?" (p. 195). Yablonsky argued that "socio-cultural" explanations alone could not answer this question because any complete explanation of joining a gang would require some consideration of the "psychological" condition of individual gang members. Alleyne and Wood (2010) recently echoed Yablonsky's position when they stated that theories of gang membership are still heavily sociological in nature and "pay scant attention to the social-psychological processes involved in joining a gang" (p. 423). A review of the gang literature quickly confirms this inattention, as only a small number of studies have directly assessed the relationship between the psychological health of adolescents and gang membership (e.g., Dmitrieva, Gibson, Steinberg, Piquero, & Fagan, 2014; Madan, Mrug, & Windle, 2011).

It is surprising that the position of Yablonsky (1963) and Alleyne and Wood (2010) has not been the focus of more research, given that the factors associated with gang joining are also implicated in studies of the correlates of mental health problems in adolescence, suggesting a possible link between poor mental health and the decision to join a gang. For instance, there is a recognized link between exposure to violence, anti-social behavior, disrupted family processes, substance use, and internalizing problems, such as depression, low self-esteem, and suicidal ideation, as well as externalizing problems including attempted suicide (Li et al., 2002; Madan et al., 2011). It may be that gang membership is a coping mechanism, whereby adolescents use the gang in an effort to manage the source(s) of their stress, whether internal (e.g., depression) or external (e.g., victimization risk), consistent with Lazarus and Launier's (1978) definition of coping. The choice of coping strategy, however, has direct implications on the alleviation and/or aggravation of these underlying symptoms, as some coping strategies (e.g., substance use, positive reinterpretation) have been found to be maladaptive (e.g., Carver, Scheier, & Weintraub, 1989; Turanovic & Pratt, 2013). Given the robust finding that gang membership exacerbates involvement in substance use (Coffman, Melde, & Esbensen, 2015; Gordon et al., 2004), violence (Decker, 1996; Melde & Esbensen, 2013), and delinquency (Decker, Melde, & Pyrooz, 2013), there is a distinct possibility that gangs may be maladaptive with respect to mental health.

Two research questions emerge from these arguments:

Research Question 1: Do youth who join gangs suffer from mental health problems at a higher rate than non-joiners?
Research Question 2: What is the effect of gang membership on indicators of mental well-being?

Perhaps, gangs offer members with some relief from mental health issues, and thus offer some adaptive qualities, irrespective of the myriad short-term and long-term problems they cause. However, gang membership may prove iatrogenic, and exacerbate underlying problems with mental health and well-being. We proceed by discussing the theoretical and empirical bases for conceptualizing gang membership as a coping strategy, and how this may affect adolescent mental health.

THEORETICAL ARGUMENTS ON GANG MEMBERS AND MENTAL HEALTH

Few theoretical arguments in the gang literature explicitly address the "internal" well-being of gang youth (Madan et al., 2011). Extant theoretical commentary often offers an

implicit or passing suggestion of the emotional well-being of gang youth, particularly young persons' emotional state prior to joining a gang. In critically summarizing Thrasher's (1927) seminal work on Chicago gangs, for instance, Short (1963) described Thrasher's explanation of gang formation and membership as a theory of "social disability." Thrasher's theoretical position was that gang youth struggled to find "social gratification" through conventional experiences because of their own social deficiencies and the failings of key social institutions such as the family and school (Short, 1963). The inability to achieve social gratification through conventional experiences made the free and unencumbered lifestyle of the street gang more appealing to many already economically marginalized youth in Chicago (Bordua, 1961). Thrasher's position suggested that gang formation and membership in Chicago was driven in part by a certain level of social discontent among a segment of the youth population. While Thrasher did not provide an extensive account of the emotional or psychological state of gang youth, his social disability thesis suggests that youth may form or join a gang in response to unfilled emotional or psychological needs.

Short (1963) further noted that Thrasher's thesis is consistent with sociological theories later advanced by scholars such as Cohen (1955) and Cloward and Ohlin (1960) that attributed gang and group delinquency among lower- and working-class youth to "status frustration" or "status deprivation." Cohen, for instance, attributed this frustration to lower-class youth's inability to meet middle-class standards of success, particularly the expectation that youth demonstrate a high academic aptitude in school. When lower-class youth fell short of this expectation, they responded by seeking social approval or status through other means such as membership in a delinquent gang (Bordua, 1961; Schwartz, 1989). Cartwright, Schwartz, and Tomson (1975) described a similar response among gang-involved boys, for they asserted that when boys receive "little confirmation of his self-worth from his family, at school, or in the local community of adults," he "seeks a more favorable definition of himself" in a gang (p. 66). Similar to Thrasher's social disability thesis, the "strain" theories proposed by scholars such as Cohen suggest that for lower- and working-class youth in particular, membership in a gang is preceded by a period where these youth are not satisfied with their social status or circumstance. The psychological implication of these theories is that the unfavorable status dynamics that give rise to gang membership likely have an adverse effect on the emotional well-being of youth.

More recent explanations of gang membership tend to be "integrated" theories that detail how various "risk factors" are interrelated and associated with gang involvement among adolescents. For instance, Thornberry, Krohn, Lizotte, Smith, and Tobin's (2003) interactional theory links a number of risk factors across multiple "domains" or "levels" (e.g., neighborhood, family, and school) to gang membership (see also Decker et al., 2013; Howell & Egley, 2005). One domain they identify is the "individual," a domain where they briefly discuss the association between emotional well-being and gang membership. Thornberry and colleagues (2003) indicated that while direct confirmation of a relationship is difficult to find in the literature, "gang members have been characterized as being personally maladjusted" (p. 60). Indeed, W. Miller (1966/2011) noted that during the 1950s, in "the heyday of the 'pathology' approach to social problems, it was fashionable to explain gangs and gang behavior in terms of abnormality—primarily emotional abnormality" (p. 207). The pathology perspective lost favor in the 1960s when sociological and structural explanations of social problems became especially popular (W. Miller, 1966/2011).

From Thrasher's (1927) social disability thesis to Thornberry and colleagues' (2003) interactional theory, the gang literature generally suggests that gang youth are not as emotionally healthy as non-gang youth, particularly as gang youth near membership. In addition, the arguments of gang scholars such as Thrasher and Cohen suggest that, at least in the short term, gang membership may yield some psychological benefit. Short (1963) noted, for instance, Thrasher's description of the gang "sound[ed] a decidedly romantic note" (p. xl). That is, the gang offered a sense of purpose and adventure not experienced by its members in the family or school. Cohen (1955) similarly argued that the gang provided a sense of status or self-worth not achieved by gang youth through conventional means such as academic performance. More recent commentary suggests that not unlike other peer or social groups, gangs can provide a "psychological sense of community" or support (Alleyne & Wood, 2012, p. 151; see also Klein, 1995; Moore, 1991; Vigil, 1988). Indeed, some gang members perceive this sense of community or support as being so strong that they consider the gang a family (e.g., Decker & Van Winkle, 1996; Joe & Chesney-Lind, 1995). This sense of community or family can also make leaving the gang especially difficult for some members, or what Belitz and Valdez (1994) characterized as equivalent to asking a gang-involved youth to commit "psychological suicide" (p. 64).

There are reasons to assume that any psychological benefit associated with gang membership is likely short in duration, if present at all. Moule, Decker, and Pyrooz (2013, p. 147) noted that over time the "pernicious effects of the gang" (e.g., further detachment from family, school, and the labor market) result "in an accelerated decline in social capital." Venkatesh (1999) also posited only short-term improvements in member well-being, given gangs often fail to provide the social support and physical protection that drives membership in the first place. For instance, delinquent peers, such as gang members, can make for unreliable and low-quality friends who have little constructive effect on a youth's emotional state over the long term (e.g., Brendgen, Vitaro, & Bukowski, 2000; Harper, Davidson, & Hosek, 2008; Marcus, 1996). These unfavorable social and peer dynamics may explain why gang membership is relatively short lived—lasting less than 1 year—for many youth (e.g., Hill, Lui, & Hawkins, 2001).

Another reason gang membership is unlikely to improve the mental well-being of youth is it increases involvement in externalizing behaviors (e.g., drug use) that compromise emotional health. Comorbid internalizing and externalizing problems have been shown to have serious consequences on long-term health-related outcomes in panel studies, especially as it relates to the intersection of conduct problems, depression, and suicide risk (Vander Stoep et al., 2011). If gang youth suffer from internalizing problems manifested through depression, low self-esteem, and a general sense of "futurelessness" and social rejection, coupled with the well-documented enhancement effect of gang membership on anti-social externalizing behaviors (e.g., aggression, substance abuse, conduct disorder; for example, Decker et al., 2013), their risk for serious mental and physical health problems in late adolescence and early adulthood is exacerbated.

EMPIRICAL RESEARCH

Thornberry and colleagues (2003, p. 8) noted that gang research has generally employed one of two research strategies: (a) an ethnographic approach in which gang members are interviewed or observed in the field, or (b) research has used a "comparative quantitative"

approach in which responses on a self-report instrument are compared for gang and non-gang youth. Both approaches have produced mixed and sometimes conflicting assessments of the psychological health of gang youth. W. Miller's (1966/2011) work with Boston gangs in the 1950s uncovered no "hard" evidence (e.g., suicides or commitments to a mental hospital) that gang youth are "emotionally disturbed." In fact, when considering whether gang youth were less happy than "other categories of persons such as middle class adolescents or working adults or the upper class elderly," Miller concluded that "based on extensive study of thousands of separate events in the lives of hundreds of gang members over many months," gang members were no less happy (p. 212). Vigil (1988) reached a similar conclusion with his ethnographic research with Latino gangs in southern California. In particular, Vigil did not view gang members as "loco," but he did assert that Hispanic members' self-esteem was strongly linked to the gang or what he referred to as "group esteem" (see also Moore, 1991). Klein (1995) offered a comparable assessment of Los Angeles gang members. He asserted that gang members were in much greater need of family, education, and job services rather than individual counseling or therapy (see also Short & Stodtbeck, 1965).

A number of "comparative quantitative" studies have also examined the relationship between measures of self-esteem or self-concept and gang membership (see Table 1). Most of these studies are cross-sectional in design, in that the self-esteem variables measure current feelings of self-worth or value at Time 1, and the gang-involvement variables measure current and/or past membership also at Time 1. This cross-sectional design allows researchers to assess whether the self-esteem of current or past gang members substantively differs from adolescents or youth who report no current or prior gang involvement, but it does not allow researchers to assess the comparative level of self-esteem or self-concept before membership, or the impact of gang membership on these concepts. For example, Esbensen and Deschenes (1998) explored the relationship between current self-esteem and prior or current gang membership (i.e., ever been in a gang or in a gang now) among eighth-grade students. Their bivariate findings revealed that self-reported gang members had lower self-esteem than non-members among both male and female students, but self-esteem was not significantly associated with gang membership in multivariate analyses.

A few studies have employed panel data to assess whether a Time 1 measure of self-esteem is associated with a Time 2 measure of gang membership. For instance, Eitle, Gunkel, and Van Gundy (2004) found that an indicator of self-concept was not significantly related to measures of future gang membership, gang orientation, or gang involvement among male students in Miami-Dade County. Klein and Maxson (2006) reviewed most of the studies in Table 1 and concluded that a youth's self-esteem is not generally predictive of gang membership. However, when a relationship between self-esteem and gang membership has been reported in the literature, the findings suggest that former, current, or prospective gang members have lower self-esteem on average than youth who report no prior or current gang involvement (Alleyne & Wood, 2010).

A smaller number of studies have explored the relationship between gang membership and indicators of emotional well-being other than self-esteem. These studies have assessed whether psychological factors such as depressive symptomatology and suicidal behavior are related to gang membership. Fried, Williams, Cabral, and Hacker (2013) assessed whether prior gang membership (i.e., ever member of a gang) was associated with attempted suicide among a national sample of ninth- and 11th-grade students. Their cross-sectional bivariate findings revealed that gang membership was associated with attempted suicide among the younger

TABLE 1: Studies of the Association Between Gang Membership and Self-Esteem

Study	Sample	Design	Results
Bjerregaard and Smith (1993)	Male and female adolescents in the Rochester Youth Development Study	Cross-sectional	Multivariate (n.s.)
Cox (1996)	Male adolescents in a secure detention facility in the southeast	Cross-sectional	Bivariate (n.s.)
Dukes, Martinez, and Stein (1997)	Male and female secondary students in a region of Colorado	Cross-sectional	Bivariate (sig.)
Eitle, Gunkel, and Van Gundy (2004)	Young male adults who once attended Miami-Dade County schools	Longitudinal	Bivariate (n.s.) Multivariate (n.s.)
Esbensen and Deschenes (1998)	Male and female eighth graders attending 42 schools in 11 states	Cross-sectional	Bivariate (sig.) Multivariate (n.s.)
Esbensen, Huizinga, and Weiher (1993)	Adolescents from high-risk neighborhoods in Denver	Longitudinal	Bivariate (n.s.)
Kent and Felkenes (1998)	Vietnamese male adolescents residing in an area of Westminster, California	Cross-sectional	Bivariate (n.s.) Multivariate (n.s.)
Maxson, Whitlock, and Klein (1998)	Male adolescents residing in high-risk neighborhoods in San Diego	Cross-sectional	Bivariate (sig.) Multivariate (n.s.)
Thornberry, Krohn, Lizotte, Smith, and Tobin (2003)	Male and female adolescents from the Rochester Youth Development Study	Longitudinal	Bivariate (n.s.) Multivariate (n.s.)
Wang (1994)	Male students attending two suburban high schools in Florida	Cross-sectional	Bivariate (sig.) Multivariate (n.s.)
Yoder, Whitbeck, and Hoyt (2003)	Male and female homeless and runaway youth from four states	Cross-sectional	Bivariate (n.s.)

Note. n.s. = not significant; sig. = significant.

students, but they found no such relationship in their multivariate analyses. Similarly, Madan et al. (2011) found a bivariate association between current gang membership and planning or attempting suicide among a cross-sectional sample of adolescents from Alabama, but this relationship was not significant in the multivariate analyses. Evans, Albers, Macari, and Mason (1996) also reported comparable findings when assessing the relationship between gang membership and suicidal thoughts and behavior among incarcerated youth in Nevada.

THE CURRENT STUDY

This research adds to these studies in a number of ways. First, there are two research questions that are explicitly addressed in this study:

Research Question 1: Does emotional health, as indicated by self-esteem, depression, suicidal thoughts, and suicide attempts predict future gang membership?
Research Question 2: Does membership in a gang affect emotional health and suicide risk?

Only a few studies have addressed the first question with panel data that measured emotional health prior to the occurrence of gang membership (e.g., Eitle et al., 2004; Thornberry

et al., 2003). With the second research question, no study to our knowledge has empirically assessed whether gang membership is associated with change in emotional health, despite some theoretical commentary suggesting that gang membership can have an advantageous effect on a youth's mental well-being—particularly self-esteem—in the short term.

This research also adds to the literature by employing a national sample of adolescents. Most gang research has been undertaken with samples drawn from a single city or a small number of municipalities or states, and studies that have assessed the emotional well-being of gang youth are no different (see Table 1). In addition, this research examines multiple indicators of emotional health rather than a single measure such as self-esteem, including depression and suicidal thoughts and behavior. These measures collectively capture multiple dimensions of emotional health, ranging from low self-esteem to attempting suicide. Finally, because gang membership is a self-selected state, we utilize recent advancements in propensity score analyses to reduce the threat of selection effects on our estimates of these processes (Ridgeway, MaCaffrey, Morral, Burgette, & Griffin, 2014).

METHOD

DATA

Data from the National Longitudinal Study of Adolescent to Adult Health (hereafter Add Health) were utilized to examine the relationship between gang membership and emotional health. The Add Health respondents were drawn from a two-stage cluster sampling design. In the first stage, adolescents attending a nationally representative sample of middle schools and high schools completed an in-school questionnaire during the 1994-1995 academic year. The second stage involved the selection of students from these sampled schools to be interviewed in their homes. Approximately 21,000 respondents (78% of those selected) completed the first in-home interview roughly 1 year after the in-school survey was administered. A second round of in-home interviews was conducted on average 11 months later with 14,738 adolescents. Current analyses were undertaken with adolescents who participated in the first and second waves of the in-home interviews.

DEPENDENT VARIABLES

Depression

The Add Health survey instrument included a modified version of the Center for Epidemiological Studies–Depression (CES-D) scale. Nineteen items asked the respondents, "How often was each of these things true during the past week?" The response scale for those items ranged from 0 (*never or rarely*) to 3 (*most of the time or all of the time*). For example, youth were asked how often in the past week they were "unable to shake the blues" and how often they felt as though their "life was a failure." The mean score on this scale was 0.59 ($SD = 0.40$) at Wave 2, with an observed range from 0 to 2.69 (see Table 2).

Self-esteem

Self-esteem was measured through six items drawn from the Rosenberg Self-Esteem Inventory (Rosenberg, 1965) and similar scales (e.g., "You like yourself just the way you are"). Adolescents answered on a 5-point scale ranging from 1 (*strongly agree*) to 5 (*strongly*

TABLE 2: Descriptive Statistics

Variables	*n* (%)	*M*	*SD*	Minimum	Maximum
Wave 1					
Male	6,378 (49)			0	1
Age		15.31	1.62	11	21
Race					
Non-Hispanic White	6,838 (53)			0	1
Non-Hispanic Black	2,621 (20)			0	1
Hispanic/Latino	2,209 (17)			0	1
Non-Hispanic Other	1,364 (11)			0	1
First generation	1,107 (9)			0	1
Both parents in Home	6,761 (52)			0	1
Number in household					
Grade repeat	2,834 (22)			0	1
School suspension	3,597 (28)			0	1
Expelled from school	581 (5)			0	1
Grade-point average		2.77	0.77	1	4
School bonding		3.75	0.86	1	5
School engagement		4.01	0.80	1	5
Teacher attachment		3.72	0.77	1	5
Parental permisiveness		5.05	1.56	0	7
Maternal warmth		4.20	0.69	1	5
Maternal attachment		4.69	0.55	1	5
Maternal involvement		3.96	1.98	0	10
Impulsivity		2.21	0.63	1	5
Friend suicide attempt	2,311 (18)			0	1
Family suicide attempt	578 (4)			0	1
Future outlook		2.51	0.44	1	5
Sexual intercourse	4,557 (35)			0	1
Drug use		6.62	12.49	0	67
Friend drug use		2.39	2.61	0	9
Delinquency		0.29	0.36	0	3
Victimization	2,692 (21)			0	1
Residential stability	6,893 (53)			0	1
Neighborhood safety	1,480 (11)			0	1
Religious involvement		2.72	1.22	1	4
Family SES		5.56	2.70	1	10
Census tract SES		−0.01	0.99	−3.01	6.71
Depression (Wave 1)		0.59	0.40	0	2.84
Self-esteem (Wave 1)		4.11	0.60	1	5
Thought about suicide (Wave 1)	1,713 (13)			0	1
Attempted suicide (Wave 1)	482 (4)			0	1
Wave 2					
Treatment/exposure					
Gang membership (Wave 2)	704 (5)			0	1
Outcomes					
Depression (Wave 2)		0.59	0.40	0	2.69
Self-esteem (Wave 2)		4.17	0.59	1	5
Thought about suicide (Wave 2)	1,405 (11)			0	1
Attempted suicide (Wave 2)	452 (4)			0	1

Note. Total sample *N* = 13,032. SES = socioeconomic status.

disagree). To ease interpretation, items were reverse coded and averaged to form a total score, with higher scores indicating greater self-esteem. Mean self-esteem at Wave 2 was 4.17 (*SD* = 0.59), with a range from 1 to 5.

Thought about suicide

Respondents were asked whether they had "seriously" thought about committing suicide in the past 12 months. Available responses for this question were "yes," coded 1, and "no," coded 0. In total, 1,405 (11%) of respondents reported having thought about suicide at Wave 2.

Attempted suicide

For those respondents who disclosed that they had thought about committing suicide, they were then asked on how many occasions "did you actually attempt suicide" in the past 12 months. Given the extremely limited number of respondents who reported more than one attempt, attempted suicide is coded 1 if a respondent affirmed that they had attempted suicide one or more times in the prior year and 0 otherwise. There were 452 (4%) respondents who reported at least one suicide attempt in the past 12 months.

TREATMENT/EXPOSURE VARIABLE

Gang membership

Following the method described by DeLisi, Barnes, Beaver, and Gibson (2009), who used the Add Health data to examine the impact of gang membership on victimization, we used a two-step procedure to identifying gang and non-gang members. First, our measure of self-reported gang membership was taken at Wave 2, when respondents were asked if they had been initiated into a named gang in the preceding 12 months. Self-reported gang membership is used in both survey research and official data as a means of determining gang status, and appears to be a robust strategy (Decker, Pyrooz, Sweeten, & Moule, 2014; Esbensen, Winfree, He, & Taylor, 2001). There were 704 (5%) respondents who reported they were initiated into a named gang at Wave 2. To ensure that our sample reflected a true comparison of gang and non-gang-involved youth, we further refined our sample through the use of an ever prevalence measure of gang membership taken at Wave 3 of the study. Specifically, respondents who failed to report gang membership at Wave 2, who then reported having ever been involved in a gang at Wave 3 (n = 1,628) were excluded from the analysis sample to ensure that gang members were not incorrectly included in our non-gang comparison group. The removal of these cases had no effect on the number of self-reported gang members at Wave 2 (n = 704), but it did reduce the number of non-gang-involved respondents in our analysis sample to 12,328. Furthermore, cases with missing data on the Wave 2 gang indicator (n = 76) were dropped from the analysis.

COVARIATES

One of the many advantages of using the Add Health data to examine the association between gang membership and mental health outcomes, including suicidal behaviors, is the large number of covariates available to control for potential sources of selection bias associated with gang joining. That is, research consistently demonstrates that gang members are

different from non-gang youth in a number of ways prior to their membership in these groups (e.g., DeLisi et al., 2009; Melde & Esbensen, 2011). The failure to account for these systematic differences can lead to inaccurate estimates of the effects of gang membership on outcomes of interest (Rosenbaum & Rubin, 1983). Given the assumptions underlying our analysis procedures, discussed below, a large number of covariates are included in our models. Due to space limitations, we do not provide a detailed description of all 35 variables in text, but rather provide a brief description of each in the appendix. All variables have been used extensively in the literature and are pertinent to the prediction of gang membership and/or our measures of mental health. These variables represent common demographic characteristics, as well as measures across important domains such as school, family, and the community, as well as social-psychological processes. Descriptive statistics for these variables are included in Table 2.

ANALYSIS STRATEGY

To account for the non-random self-selection of people into gangs present in the Add Health data (see DeLisi et al., 2009), the following analyses utilize the potential outcomes framework through the use of propensity score weighting to reduce the possibility of confounding in our estimates. The potential outcomes framework has become a prominent strategy to reduce the possibility of confounding in observational data, where random allocation of particular treatments/exposures is not feasible or practical (Rosenbaum & Rubin, 1985; Winship & Morgan, 1999). While not a panacea, this framework has shown to be quite useful in balancing pretreatment covariates across groups.

A primary assumption of propensity score analysis, as well as regression models, is that all confounders of selection into treatment (e.g., gang membership) and outcome (e.g., mental health) have been measured and included in the propensity model predicting gang membership. One can never know for sure whether this assumption is met, but it becomes more plausible as more measured confounders are included in the prediction model. That is, including a measured confounder in the propensity model mitigates any bias of the causal effect estimate which is due to an unmeasured confounder to the degree of their correlation (Coffman et al., 2015). An advantage of using propensity scores is that many more confounders may be accounted for in a single model, and balance diagnostics and sensitivity analyses are available to monitor whether balance between groups was achieved.

Propensity scores are typically estimated via logistic or probit regression, which has produced adequate balance across studies using this technique. Recent evidence suggests, however, that boosted regression methods have superior predictive abilities and perform better than logistic models in producing covariate balance and reduced variance across covariates (Ridgeway et al., 2014). In particular, the use of boosted regression trees provides the added flexibility of automatically including important interactions and non-linearities in the data that must be explicitly specified in logistic models (Elith, Leathwick, & Hastie, 2008). Thus, the threat of omitted variables bias—not including important non-observed variables in the prediction model—is further alleviated when using boosted regression trees, because it has the added benefit of controlling for not only the degree to which unobserved variables are correlated with direct effects but also the degree to which such factors are correlated with the interactions and non-linearities among observed variables that are included in these models. Inclusion of these additional parameters reduces the

possibility of substantive bias introduced through unobserved differences between treatment and comparison groups. Given these advantages, we derived our propensity score estimates via the *twang* (i.e., toolkit for weighting and analysis of non-equivalent groups) package in R (Ridgeway et al., 2014).

Given the assumptions underlying our analysis strategy, a large number of variables ($n = 35$) are included in our model predicting gang membership to derive our predicted probabilities, including the Time 1 measures of our Time 2 outcomes (described above). All variables described in the appendix have been used extensively in the literature and are pertinent to the prediction of gang membership and/or our measures of mental health. These variables represent commonly used demographics, community characteristics, self-reported behaviors, and measures of attitudes and emotions that are correlated with anti-social behavior. All of these measures were taken at Wave 1, and thus predate our measure of self-reported gang membership. In addition, with the exception of the Wave 2 gang variable, any missing data on the study variables were imputed using the "ice" procedure in Stata (Royston, 2005).

After obtaining propensity scores via our generalized boosted regression model, we imported these propensity scores into the *psmatch2* module (Leuven & Sianesi, 2003) available in Stata 10.0.[1] Even though the matching algorithms are robust across large samples, our reported analyses are based on the Epanechnikov kernel weighting procedure, because this strategy has shown to produce lower variance than matching procedures (Caliendo & Kopeinig, 2008). This procedure uses weighted averages of comparison cases to construct the counterfactual, so that as the propensity scores of individuals in the comparison group are further away from those in the treatment group the weight they receive diminishes accordingly. This technique makes use of a bandwidth that constrains all matches to a specific difference in propensity estimates, with weights set to 0 for all cases exceeding this bandwidth. Given the large sample, all reported analyses are based on a rather conservative bandwidth of .001. Cases with predicted probabilities greater than the absolute value of .001 away from those in the opposite condition (i.e., treatment/control) are dropped from the analysis, because these cases do not serve as proper counterfactuals (i.e., they are outliers); this is referred to as non-common support or off-support.

Balance on Time 1 covariates, before and after weighting, was assessed using standardized percent bias (bias; Rosenbaum & Rubin, 1985), *t* tests or chi-square analysis depending on the distribution of the variable, and a variance ratio test. The use of bias and *t*/chi-square tests is standard in the propensity score literature and helps assess whether substantive mean differences in covariates exist before weighting, with bias scores greater than the absolute value of 20% indicative of unacceptable differences between treatment and comparison groups. The variance ratio test is complimentary to these aforementioned tests, as it detects whether there are significant differences in the distributions of covariates, which may remain despite similar mean differences. A score of 1.00 is indicative of perfect variance balance between treatment and comparison groups, while variance ratios that exceed the 2.5th and 97.5th percentiles of the *F*-distribution are considered unbalanced (Leuven & Sianesi, 2003).

RESULTS

To determine whether respondents who became gang involved had elevated levels of mental health issues prior to gang joining, we compare these two groups of youth using our

unweighted comparisons as shown in Table 3. With the exception of self-esteem, respondents who later became gang members reported elevated levels of mental health issues relative to non-gang youth. Therefore, while the difference in reported levels of self-esteem is small, youth who went on to become gang involved reported greater levels of depressive symptoms (bias = 41.20) and were nearly 2 times as likely to report thoughts of suicide (gang = .24 vs. non-gang = .13) and 3 times more likely to report having attempted suicide in the prior 12 months (gang = .10 vs. non-gang = .03) than non-gang youth. These results, again with the exception of self-esteem, suggest systematic differences in mental well-being between youth at risk for gang membership and those who never reported involvement in a gang in the Add Health data.

In addition to mental health, research consistently demonstrates that youth who join gangs are not similar to other youth across a host of risk domains (e.g., family, individual, community, school), and thus any attempt to determine the impact of gang membership on related outcomes must account for these preexisting differences. As expected, Table 3 provides evidence that youth who join gangs are systematically different than comparison youth (e.g., race, sex, family composition) and have elevated levels of many risk factors associated with anti-social outcomes. In particular, of the 38 variables examined for balance,[2] 23 covariates had an absolute percent bias above 20, which indicates a moderate-to-large difference between treatment and comparison respondents. Furthermore, *t*/chi-square tests suggested significant differences ($p < .05$) between groups on 36 covariates, while variance ratio test suggested 20 significant ($p < .05$) differences in the distribution of these variables across gang and non-gang youth.[3] All of these differences are in the direction of greater risk associated with anti-social outcomes, and thus it is safe to conclude that gang youth were at elevated risk for problematic behaviors and poor mental health outcomes regardless of their eventual involvement in a gang.

The use of kernel weights based on our generalized boosted regression is meant to balance the treatment and comparison groups across all covariates, so that efficient estimates of the effect of gang membership on our measures of mental health can be derived. Table 3 demonstrates that this procedure achieved balance across all covariates. The only exceptions include a significant difference ($p < .05$) between gang and non-gang youth in their level of school engagement, delinquency, and victimization at Time 1, although both the respective bias and variance ratio tests suggest that these differences are negligible, and thus should not affect our propensity score analysis. Because balance was achieved across all of these covariates, we turn to our propensity score model to determine the impact of gang membership on our indicators of mental health.

Our analysis of the impact of gang membership on mental health includes three separate measures of effect, including the unweighted comparison of gang and non-gang youth, the weighted estimate of the average treatment effect on the treated (ATT), and the weighted estimate of the average treatment effect (ATE). In this case, the ATT represents the estimated impact of gang membership on those in the sample who experienced this treatment. The ATE represents the estimated average effect of gang membership if everyone in the sample were exposed to gang membership, as opposed to if everyone did not join a gang. The choice to use a bandwidth of .001 in our Epanechnikov kernel matching procedure led to the elimination of 113 gang members (113/704 or 16%) and 1,766 non-gang-involved (1,766/12,328 or 14%) youth from the sample due to non-common support. That is, these youth did not evince propensity scores within .001 of a respondent in the alternative group.

TABLE 3: Balance Statistics for Propensity Score Analysis

	Unweighted Comparisons					Propensity Score Weighted Comparisons				
	Gang	Non-Gang		Statistic Variance		Gang	Non-Gang		Statistic Variance	
	M	*M*	Bias	*t*/Chi²	Ratio	*M*	*M*	Bias	*t*/Chi²	Ratio
Sex (male)	0.68	0.48	42.10	11.22*	0.94	0.66	0.69	−7.80	−1.38	1.06
Age	15.16	15.32	−10.00	−2.55*	0.99	15.14	15.24	−6.70	−1.18	1.02
White	0.32	0.54	−43.90	−11.02*	0.91	0.36	0.34	4.00	0.69	1.03
Black	0.24	0.20	11.00	2.94*	1.18	0.25	0.26	−2.70	−0.44	0.97
Hispanic	0.30	0.16	33.10	9.50*	1.54*	0.27	0.29	−4.70	−0.76	0.97
Other	0.13	0.10	9.00	2.45*	1.25	0.13	0.12	3.60	0.61	1.08
First generation	0.07	0.09	−6.10	−1.50	0.83	0.07	0.08	−2.50	−0.44	0.91
Both parents in home	0.40	0.53	−25.90	−6.62*	0.99	0.41	0.41	−1.20	−0.21	0.99
Number in household	4.02	3.68	17.90	5.21*	1.64*	3.97	3.89	4.10	0.68	1.16
Grade repeat	0.37	0.21	35.30	9.89*	1.43*	0.35	0.35	0.20	0.02	1.00
School suspension	0.60	0.26	72.50	19.77*	1.36*	0.54	0.60	−11.90	−1.92	1.01
Expelled from school	0.17	0.04	43.90	16.43*	3.58*	0.13	0.14	−3.40	−0.52	0.92
Grade-point average	2.32	2.80	−62.10	−16.96*	1.16	2.37	2.30	10.00	1.76	1.04
School bonding	3.50	3.76	−29.50	−8.03*	1.24*	3.55	3.47	8.90	1.51	0.95
School engagement	3.53	4.03	−56.80	−16.39*	1.54*	3.66	3.53	15.40	2.52*	1.02
Teacher attachment	3.28	3.74	−57.00	−15.84*	1.39*	3.35	3.29	7.50	1.24	1.01
Parental permisiveness	4.91	5.06	−9.20	−2.46*	1.19	4.94	4.98	−2.60	−0.45	0.99
Maternal warmth	4.10	4.20	−14.10	−3.69*	1.09	4.10	4.11	−1.40	−0.24	1.01
Maternal attachment	4.64	4.70	−9.70	−2.63*	1.22*	4.63	4.66	−4.10	−0.69	1.15
Maternal involvement	3.81	3.97	−7.90	−2.06*	1.04	3.80	3.75	2.70	0.45	0.95
Impulsivity	2.28	2.20	12.40	3.34*	1.20	2.28	2.29	−1.20	−0.20	1.05
Friend suicide attempt	0.26	0.17	21.30	5.91*	1.35*	0.24	0.25	−3.10	−0.51	0.95
Family suicide attempt	0.08	0.04	15.00	4.48*	1.77*	0.07	0.07	−2.70	−0.42	0.92
Future outlook	2.52	2.51	3.20	0.87	1.30*	2.51	2.50	2.60	0.43	1.00
Sexual intercourse	0.57	0.34	48.70	12.82*	1.08	0.54	0.58	−7.60	−1.28	1.04
Drug use	13.79	6.21	51.70	15.80*	1.86*	11.63	12.77	−7.80	−1.23	0.95
Friend drug use	4.09	2.29	64.90	17.98*	1.28*	3.72	3.90	−6.50	−1.09	1.05
Delinquency	0.69	0.27	91.40	32.31*	2.55*	0.55	0.64	−17.70	−3.12*	1.05
Victimization	0.55	0.19	80.80	23.51*	1.47*	0.48	0.55	−17.00	−2.61*	1.06
Residential stability	0.46	0.53	−14.60	−3.76*	1.00	0.47	0.48	−1.90	−0.33	1.01
Neighborhood safety	0.21	0.11	27.80	8.21*	1.72*	0.19	0.19	1.60	0.26	1.03
Religious involvement	2.56	2.73	−13.70	−3.57*	1.04	2.58	2.53	4.00	0.68	0.96
Family SES	4.78	5.60	−31.20	−7.84*	0.90	4.85	4.88	−1.10	−0.19	1.03
Census tract SES	0.25	−0.03	27.50	7.05*	1.01	0.20	0.24	−4.30	−0.75	0.98
Self-esteem	4.03	4.11	−12.50	−3.34*	1.17	4.04	4.01	4.60	0.81	1.03
Depression	0.75	0.58	41.20	11.13*	1.27*	0.73	0.75	−4.60	−0.79	1.02
Thought about suicide	0.24	0.13	30.40	8.91*	1.71*	0.22	0.22	0.40	0.06	1.01
Attempted suicide	0.10	0.03	25.20	8.43*	2.61*	0.08	0.07	0.80	0.13	1.02

Note. Bias = standardized percent bias; unweighted comparison, N = 11,153. SES = socioeconomic status.
*$p < .05$.

Alternative bandwidth specifications (e.g., no bandwidth, .01, .05) did not have a substantive impact on our results (available upon request).

The results in Table 4 suggest that estimates from an unweighted sample would have indicated a significant effect of gang membership on self-esteem (mean difference = −0.154, $p < .05$). Weighted results, however, suggest that gang membership has no systematic ($p > .05$) impact on self-esteem. Gang membership, however, appears to exacerbate the

TABLE 4: Propensity Score Analysis of the Effect of Gang Membership

	Treatment Status			
	Gang	Control		
Estimate	(*n* = 591)	(*n* = 10,562)	Difference	*SE*
Self-esteem				
Unmatched	4.027	4.181	–.154*	.023
ATT	4.044	4.081	–.037	.030
ATE			–.098	
Depression				
Unmatched	0.797	0.578	.219*	.015
ATT	0.776	0.684	.092*	.020
ATE			.177	
Thought about suicide				
Unmatched	0.244	0.100	.144*	.012
ATT	0.235	0.141	.094*	.019
ATE			.164	
Attempted suicide				
Unmatched	0.125	0.030	.095*	.007
ATT	0.110	0.054	.056*	.014
ATE			.053	

Note. Generalized boosted regression model (interaction depth = 2) derived propensity score, with Epanechnikov Kernel weighted analyses (bandwidth = .001) conducted in Stata 13 (*psmatch2*). There were 113 gang members and 1,766 non-gang youth dropped due to non-support (i.e., relative propensity scores were outside the bounds of our bandwidth). ATT = average treatment effect on the treated; ATE = average treatment effect.
*$p < .05$.

preexisting differences in depression as noted in Table 3. Specifically, the ATT of .092 ($p < .05$) suggests that those who joined a gang reported systematically higher depression scores than what would have been expected absent gang membership. The corresponding ATE of .177 suggests that gang membership would have a greater impact on the average respondent in the Add Health data set than on those respondents who actually joined a gang.

Finally, gang membership is associated with increases in both thoughts of suicide and suicide attempts. With respect to suicidal thoughts, the ATT of .094 ($p < .05$) represents a 67% increase (i.e., .094/.141) in this outcome for youth who actually join a gang, relative to what would be expected absent gang membership. Again, the ATE of .164 suggests that the influence of gang membership would be greater, on average, if those in the general population were exposed to these groups. Similarly, the prevalence of those who reported having attempted suicide increased by 104% (i.e., .056/.054) for those who actually joined a gang (ATT = .056, $p < .05$). The ATE of .053 indicates that this effect would be similar on the population in general.

DISCUSSION

Research on street gangs over the past 50-plus years has taken a decidedly social problems perspective, wherein the negative consequences of these groups on communities and individual members are at the forefront of study (Decker et al., 2013). Yet, for all of the problems associated with gangs and gang membership there is no shortage of these groups in communities throughout the world. Youth remain attracted to what membership in a gang has to offer, in spite of this mountain of evidence. This begs the question, from a subjective standpoint, do gangs benefit youth in ways unexplored via a reliance on a research paradigm so

heavily focused on the negative behavioral consequences of gang membership? After all, youth seek out gangs for subjective reasons, and thus there is a very real possibility that, as suggested by Thrasher (1927) and Cohen (1955), these groups fulfill, at least partially, the desires of their members. The psychological well-being of gang youth, however, has not garnered the level of attention needed to fully understand the potential risks and needs present in this population (Alleyne & Wood, 2010).

The research literature clearly suggests a connection between the accumulation of risk factors across multiple domains and gang joining (Melde, 2015), which suggests that gang youth are exposed to a number of personal and social factors that lead to problematic outcomes, including poor mental and physical health. To this end, the current study examined the association between gang membership and indicators of mental health in adolescence, including depression, self-esteem, suicidal ideation, and attempted suicide, to discern whether gang members have elevated levels of these mental health issues prior to gang joining. The influence of gang joining on these very same factors was also examined to determine whether gang membership offers at least short-term help to youth who join gangs, or whether gangs further exacerbate these mental health problems.

Results of the current study suggest that youth who eventually join gangs, indeed, have relatively elevated levels of depression and report both having seriously thought about suicide and having attempted suicide at rates exceeding the general population. Perhaps more disconcerting, however, are the findings related to the effect of joining a gang on these outcomes, which suggest that gang membership exacerbates these preexisting mental health issues. In particular, gang membership is associated with greater levels of depression, as well as a roughly 67% increase in thoughts of suicide and a 104% increase in the prevalence of suicide attempts. Thus, while adolescents have reported joining a gang in response to a number of problematic social and familial circumstances, gang membership does not appear, on average, to improve levels of mental health, at least in terms of depression and suicide risk.

These findings should be considered with certain limitations in mind. First, the Add Health data were generated from a national sample of youth, but adolescents not enrolled in school are absent from the sample. These adolescents include school drop-outs and institutionalized youth, who are at greater risk for gang involvement (Howell, 2012). Second, adolescents who were high school seniors at Wave 1 were not interviewed at Wave 2 as part of the Add Health study design. As a result, the current sample likely underrepresents youth who joined a gang during late adolescence. Third, the current gang variable does not differentiate members by their social position in the gang. This coding scheme is common in empirical gang studies, but some quantitative research has distinguished gang leaders from non-leaders or distinguished members by their level of "gang embeddedness" (e.g., Dmitrieva et al., 2014; Pyrooz, Sweeten, & Piquero, 2013). Findings from these studies suggest that the effects of gang membership are affected by a youth's social position or level of embeddedness in the gang.

Despite these limitations, the current study findings add to a list of iatrogenic effects associated with gang membership. That is, youth and young adults have consistently identified factors such as the threat of victimization, income generation, and a sense of belonging (e.g., the gang as alternate family) as reasons for joining street gangs. Research on the consequences of gang membership, however, consistently demonstrates that not only do gangs not improve these factors in the lives of their members but they actually also make things worse. Instead of reducing the threat of victimization, gangs have shown to produce both short-term (e.g., Melde, Taylor, & Esbensen, 2009) and long-term increases in victimization risk (e.g., DeLisi et al., 2009). Krohn, Ward, Thornberry, Lizotte, and Chu (2011) and Levitt

and Venkatesh (2001) have demonstrated the pernicious impact of adolescent gang membership on annual earnings into early adulthood. In this way, gang membership appears to be a form of maladaptive coping, whereby youth seek out these groups to alleviate particular issues in their lives, only to find these problems are exacerbated through membership. With respect to the current findings, these maladaptive effects of gang membership on depression and suicidal actions can have lasting, and potentially deadly, consequences.

In fact, many of the same personal and situational factors that increase the likelihood of violence toward others have been shown to increase suicide risk, including exposure to violence and fear-provoking stimuli, which desensitizes individuals to pain and the fear of death (e.g., DeWall, Anderson, & Bushman, 2011). As has been demonstrated in prior research, youth gang membership is associated with systematic increases in exposure to, and participation in, violent events (Decker, 1996; Melde & Esbensen, 2013; Pyrooz & Decker, 2013). There is also evidence to suggest that gang membership leads to lower levels of fear of violent victimization, despite an increase in actual victimization experiences (Melde et al., 2009). Furthermore, membership in street gangs leads to an increase in access to weapons, including guns (Spano & Bolland, 2011; Watkins, Huebner, & Decker, 2008), which is a robust risk factor for completed suicide (e.g., M. Miller & Hemenway, 2008). Together, this body of work suggests that gang membership has the potential to desensitize youth to violence while providing increased access to the tools most likely to lead to a completed suicide. Based on this growing body of literature, the intersection of violence, mental health, and access to weapons among gangs and gang members is an area for future exploration.

APPENDIX

VARIABLES USED in the Creation of the Propensity Score Using Generalized Booted Regression

Wave 1 Variables	Coding Description
Sex	Coded 1 if respondent is male, 0 if female
Age	Age of respondent in years
Race	Respondent race/ethnicity, coded 1 if White, 2 if Black, 3 if Hispanic/Latino, 4 if other
First generation	Coded 1 if not born in the United States, 0 otherwise
Both parents in home	Coded 1 if both biological parents present in home, 0 otherwise
Number in household	Number of residents in the household
Grade repeat	Coded 1 if ever held back a grade or forced to repeat a grade
Suspension	Coded 1 if ever received an out-of-school suspension, 0 otherwise
Expelled	Coded 1 if ever expelled from school, 0 otherwise
GPA	Coded as the average 4-point GPA for English, history, math, and science
School bonding	Averaged three-item school/student bond index
School engagement	Averaged three-item school engagement index
Teacher attachment	Averaged three-item teacher attachment index
Parental permissiveness	Summed seven-item parental permissiveness index
Maternal warmth	Averaged five-item Maternal Warmth scale
Maternal attachment	Mean score across two maternal attachment items
Maternal involvement	Summed 10-item Maternal Involvement scale
Impulsivity	Averaged four-item Impulsivity scale
Self-esteem	Averaged response to six-item self-esteem index
Depression	Averaged score across 19 depression items
Thought about suicide	Coded 1 if seriously thought about committing suicide in the past 12 months, 0 otherwise

(continued)

Appendix (continued)

Wave 1 Variables	Coding Description
Attempted suicide	Coded 1 if actually attempted suicide last 12 months, 0 otherwise
Friend suicide attempt	Coded 1 if any friends tried to commit suicide in the prior 12 months, 0 otherwise
Family suicide attempt	Coded 1 if any family member tried to commit suicide in the prior 12 months, 0 otherwise
Future outlook	Averaged three-item Outlook for the Future scale
Sexual intercourse	Coded 1 if the respondent reported ever having sex, 0 otherwise
Drug use	Summed three-item Drug Use scale
Fried drug use	Summed three-item index of peer drug use
Delinquency	Averaged score 15-item Total Delinquency scale
Victimization	Coded 1 if respondent reported being the victim/witness of serious crime, 0 otherwise
Residential stability	Coded 1 if respondent lived in the same residence as in 1990, 0 otherwise
Neighborhood safety	Coded 1 if respondent reported usually feeling unsafe in your neighborhood, 0 otherwise
Religious involvement	Sum of how often respondent attended religious services in the prior 12 months
Family SES	SES of the family or household
Census tract SES	Standardized factor analyzed score for tract-level SES

Note. SES = socioeconomic status; GPA = grade-point average

NOTES

1. The decision to use the *psmatch2* program in Stata 10.0 was based upon personal preference and familiarity with post-estimation procedures the author(s) utilized for model specification and diagnostics. A number of supplementary analyses were completed using the *twang* package in R, following the procedures outlined by Ridgeway, MaCaffrey, Morral, Burgette, and Griffin (2014), including use of propensity weights in regression models and doubly robust analyses. While small differences in effect sizes emerged across these strategies, the substantive findings were identical. Given that the Epanechnikov kernel matching procedure imposed greater restrictions on comparison cases in the sample, effect sizes from our reported analyses tended to be smaller than those computed in R. We note any differences across strategies where appropriate.

2. Race was left as an ordered variable for the boosted model, instead of creating separate dummy-coded indicator variables. This is a more efficient way to specify a boosted regression model, given the *twang* package automatically scans the data for individual interactions and effects. Ridgeway et al. (2014) even described the creation of such indicators in boosted models as "counterproductive" (p. 3). In all, there were four race/ethnicity categories, including non-Hispanic White, Black, Hispanic, and other.

3. Our balance diagnostics in analyses using the *twang* package in R included the Kolmogorov–Smirnov (KS) test, which is similar in purpose to the variance ratio test. To calculate the KS statistic, our models in R are based upon 500 Monte Carlo simulations. In total, 33 covariates displayed significant differences in distribution according to the KS statistic before weighting, but zero significant differences remained in weighted models.

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