



ORIGINAL ARTICLE

Suicidal thoughts in low-income adolescents: a longitudinal analysis

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Abstract

Objectives The aim of this study was to identify whether suicidal ideation in low-income adolescents is influenced by social environment and social support.

Methods We performed a growth curve model using a sample of 6687 low-income adolescents living in the Mobile, AL Metropolitan Statistical Area. The outcome for the present study was whether the participant had thought about suicide in the past 12 months.

Results From 1998 to 2011, an average of 14.3% of the study participants indicated that they had considered killing themselves in the past 12 months on an annual basis (11.2–17.6%). Accounting for confounding factors, positive peer support, inevitability of violence, and having moved in the past year resulted in an increased risk, though the effect of inevitability of violence decreased over time. Meanwhile, elevated perceptions of contextual safety and increased parental warmth resulted in reduced risk. These findings suggest that social support and social context are important indicators of suicidal ideation in adolescents.

Conclusions Suicidal ideation is an important predictor of suicidal behavior. If suicidal ideation can be prevented, or predicted, then it is possible that suicidal behavior can be reduced.

Keywords Suicide · Social epidemiology · Adolescent health · Suicidal ideation

Introduction

Suicide is the third leading cause of death in adolescents and young adults, with recent data suggesting that suicide rates among older adolescents have been increasing since 2004 (Schilling et al. 2009). According to the Centers for Disease Control and Prevention (CDC), children aged 10–14 had a suicide rate of 1.29 per 100,000, while children 15–19 experienced a substantial jump to 7.53 per 100,000, with suicide more common among white adolescents than African-American children (National Center of Health Statistics 2014). Though suicide attempts are more commonly observed among adolescent males than females (CDC 2013), with 15–19-year-old males reporting significantly higher rates than their female counterparts

(14.2 per 100,000 compared to 5.1 per 100,000) (MMWR 2017), females are more likely to have suicidal thoughts (SAMHSA 2014; Joe et al. 2009). Approximately one third of all adolescents report having experienced suicidal ideation (Kerr et al. 2008), a significant predictor of suicide attempt (Baca-Garcia et al. 2011). Within the African-American community, adolescents experience a 12-month incidence of suicidal ideation equal to 3.2% and an estimated lifetime prevalence of 7.5% (Joe et al. 2009).

Past studies have revealed multiple correlates of suicidal ideation for adolescents. Hopelessness and depression are positively and significantly associated with suicidal ideation (Cukrowicz et al. 2011; Spann et al. 2006), historically functioning as a mediating factor between predictors and outcome (Lin et al. 1979). Prior research suggests that greater levels of neighborhood attachment have been found to reduce reported levels of hopelessness among adolescents (Bolland et al. 2005). Findings regarding peer support are less clear. Certain studies indicate a negative association with suicidal behavior (Rigby and Slee 1999) and depression (Newman et al. 2007), while other studies failed to find any relationship between peer support and suicidal behavior (Kerr et al. 2006; Prinstein and Aikins 2004).

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Recognizing the inconsistent outcomes, research suggests that peer support may function as a moderating effect on suicidal behavior (Fotti et al. 2006). Similarly, children who experience better relationships with their parents are less likely to experience self-harming and suicidal behavior (Donath et al. 2014; Fotti et al. 2006; Kidd et al. 2006; Klemmera et al. 2017). Conversely, authoritative parenting and rejecting–neglecting parenting were associated with a greater risk of adolescent suicide attempts (Donath et al. 2014).

Existing data suggest that social context is associated with adolescent suicidality (Kidd et al. 2006). Studies have found that children in disadvantaged neighborhoods experience increased levels of suicidality (Lambert et al. 2008). Similarly, neighborhood perception, accounted for by the reported presence of ambient hazards and social cohesion, resulted in increased levels of depression (Aneshensel and Sucoff 1996), which, as previously alluded to, is often associated with suicidal ideation. A study of 424 neighborhoods in South Korea suggests that neighborhoods with higher rates of area deprivation, lack of social support, and socioeconomic disadvantage have higher rates of suicides than compared to others (Yoon et al. 2015). Similarly, neighborhood connectedness has been found to impact self-harming behavior, with lower sense of belonging being nearly three times more likely to report self-harm (Klemmera et al. 2017). Furthermore, ‘social exit events’ have been found to have a significant role in the manifestation of suicidal behavior (Spirito et al. 1989).

Given these findings, and the general lack of information regarding suicidal ideation in low-income communities, it is important to reconsider what we know about adolescent suicidal ideation within the context of poverty. More directly, how does social support and social context impact the incidence of suicidal ideation among low-income adolescents? To evaluate this question, we will use data from the Mobile Youth Survey.

Methods

The Mobile Youth Survey (MYS) is a community-based, multiple cohort longitudinal study with annual data collection. It focuses on adolescents aged 9.75–19.25 years of age who live in extremely impoverished neighborhoods in the Mobile, Alabama Metropolitan Statistical Area (MSA), although it also follows those youths as they move to other neighborhoods in the MSA. It was begun in 1998, with 1771 participants, and increased to over 12,500 different adolescents. The MYS was conducted in Mobile and Prichard, Alabama. Mobile is a major city of approximately 193,000 located on the Gulf coast in the Mobile Metropolitan Statistical Area, which has a population of

approximately 413,000 people. In 2010, 50.6% of Mobile’s population was African-American and 22.3% lived in poverty with a median household income of \$38,722. Prichard, a city of roughly 22,000, borders Mobile on its north side. In 2010, 85.8% of the population was African-American, and 36.3% lived in poverty, with a median income of \$23,726. When data collection began, the median household income within the targeted neighborhoods was less than \$12,000, with a median poverty rate of 57% and 30.5% of residents living in extreme poverty (< 50% of the poverty level), and 95% of the residents were African-American (Bolland et al. 2007).

Through 2011, a total of 12,387 respondents contributed 36,156 data points. Of these respondents, 4334 (34.99%) contributed only a single wave of data; 2456 (19.83%) contributed two waves of data; 1730 (13.97%) contributed three waves of data; 1267 (10.23%) contributed four waves of data; and 2600 (20.99%) contributed five or more waves of data. The estimated response rate for the initial year of data collection (1998) is between 72.7% and 78%. Every subsequent year remained around 88%.

Due to the manner in which racial identity was collected, it was possible for respondents to select multiple races, despite the presence of a ‘mixed race’ option. Of the 12,387 respondents, 1835 identified more than one category, with 164 selecting all four. Given the presence of a ‘mixed race’ option, the presence of multiple selections draws into question the validity of the response. Of those who selected only one racial group (10,458), 98.5% of the respondents identified as African-American (10,305), which is fairly consistent with the aforementioned racial representation within the neighborhoods. Consequently, the sample was limited to African-American respondents with two or more waves of participation resulting in a sample of 6687 valid respondents contributing 25,447 data points (Table 1).

Measures

Analysis was performed using multiple methods of variable construction. A standardized variable was constructed to represent parental warmth. In addition, scales were utilized to represent the remaining theoretically relevant concepts—hopelessness, perceived peer support, neighborhood perception, attitude toward self, inevitability of violence, and experience with violence. Information regarding the individual scales can be found in Table 2.

Social Support

Parental warmth, perceived peer support, and sense of community were included as covariates accounting for the impact of social support. Parental warmth was calculated as

Table 1 Mobile Youth Survey: multiple cohort design and demographic characteristics of cohorts in year of enrollment (USA, 1998–2011)

	Cohort														Total
	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	
N_{total}	1376	1982	1873	2051	1934	1945	2059	2271	2065	2578	2405	2579	2532	–	25,447
$N_{\text{new cohort}}$	1376	606	321	475	332	350	326	455	361	619	446	568	452	–	6687
Data points															
1	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
2	344	195	84	125	100	109	69	116	86	215	166	322	519		2190
3	253	149	66	102	77	69	67	100	105	213	180	348			1463
4	234	123	63	96	62	54	65	103	85	190	189				1044
5	170	121	52	62	50	68	56	82	92	136					728
6	168	84	41	68	40	46	56	96	62						531
7	85	66	57	57	47	54	61	59							362
8	77	39	25	40	42	37	38								215
9	31	39	27	42	34	21									117
10	9	21	6	9	8										29
11	4	5	3	2											7
12	1														1
Descriptive statistics															
Mean age	13.1	12.4	11.7	11.9	11.6	11.6	11.8	12.1	12.1	12.3	12.3	12.4	12.3	–	
% Female	49.9	47.6	48.2	49.2	49.3	49.0	51.4	46.1	49.8	49.3	50.8	51.4	46.5	–	
% Suicidal ideation	15.0	17.6	15.8	11.7	15.4	15.5	15.0	11.2	14.1	12.8	14.2	14.2	12.8	–	

a sum of standardized values, which allowed for separate and summative effects of paternal ($\alpha = 0.80$ – 0.87) and maternal ($\alpha = 0.61$ – 0.72) warmth, while also allowing for the reality of single parent households, which represents 26.73–30.02% (varying by year) of all households. Perceived peer support consists of two separate scales, one accounting for positive support ($\alpha = 0.82$ – 0.92) and the other accounting for negative support ($\alpha = 0.80$ – 0.90). Both scales have a maximum value of 12, with increased values indicating greater levels of positive and negative support. Sense of community (Glynn 1981) ($\alpha = 0.55$ – 0.67) consists of a series of questions that communicate a positive or negative association regarding the respondents place within and perception of their neighborhood. Greater sum values represent a greater investment in the community.

Social Context

Contextual safety, perceived inevitability of violence (Bandura 1973), and having moved in the past 12 months were utilized as indicators of social context. Contextual safety ($\alpha = 0.27$ – 0.50) accounts for neighborhood and school safety, with scores ranging from 0 to 6, with greater values representing increased perceived safety. Inevitability of violence ($\alpha = 0.61$ – 0.76) is a summed scale, ranging

from 0 to 8, with greater values representing increased perceived inevitability of violence. Lastly, having moved in past 12 months was constructed as a dichotomous variable.

In addition to the above variables, the analysis controlled for the impact of gender, age, self-worth (Harter 1982), hopelessness (Kazdin et al. 1983), and experience with violence (Browne et al. 2001). Self-worth ($\alpha = 0.18$ – 0.33) and hopelessness ($\alpha = 0.66$ – 0.79) are both scales where greater values represent higher degrees of the measured concept. Experience with violence consists of two separate measures—victim of violence ($\alpha = 0.39$ – 0.65) and perpetrator of violence ($\alpha = 0.55$ – 0.73). Both variables measure the existence, and frequency, of knife violence and gun violence, both as a victim and as a perpetrator, with possible responses including not at all (0), once (1), and more than once (2). The responses to knife and gun victimization/perpetration were summed, respectively, to consist of variables ranging from 0 to 4.

The dependent variable, suicidal ideation, was measured by the question ‘In the past year (12 months), did you seriously think about killing yourself?’ with a dichotomous response of ‘Yes’ (1) or ‘No’ (0). Similar measures are employed in the Youth Risk Behavior Surveillance System (YRBSS) (Brausch et al. 2011; Lowry et al. 2014).

Table 2 Scale reliability and descriptive statistics for scales included in analysis (USA, 1998–2011)

Scales	Reliability (Cronbach's α) ^a	Citation (if applicable)	Sample items	Descriptives (mean/SD)
Parental warmth ^b	N/A	Lamborn et al. (1991)	S/he spends time just talking with me We do fun things together	NA/1.60
Positive peer support	0.82–0.92	N/A	How many of your friends think it's cool if you don't use drugs? How many of your friends think it's cool if you do well in school?	5.47/4.25
Negative peer support	0.80–0.90	N/A	How many of your friends think you are a punk if you don't drink alcohol? How many of your friends think you are a punk if you don't have sex?	2.30/3.07
Sense of community	0.55–0.67	Glynn (1981)	I feel I am an important part of my neighborhood I do not like living in my neighborhood	6.86/2.45
Contextual safety ^c	0.27–0.50	N/A	How much of the time do you feel unsafe in your neighborhood? How much of the time do you feel unsafe at school?	3.53/1.56
Inevitability of violence	0.61–0.76	Bandura (1973)	It is not possible to avoid fights in my neighborhood When I get mad, I usually don't care who gets hurt	3.55/2.20
Hopelessness	0.66–0.79	Kazdin et al. (1983)	All I see ahead of me are bad things, not good things I don't expect to live a very long life	1.33/1.70
Self-worth	0.18–33	Harter (1982)	I usually (don't) make good decisions I usually (don't) like the kind of person I am	4.57/1.49
Victim of violence	0.39–0.65	Browne et al. (2001)	In the past year (12 months), did someone cut or stab you bad enough that you had to see a doctor? In the past year (12 months), did someone shoot a gun at you?	0.23/0.64
Perpetrator of violence	0.55–0.73	Browne et al. (2001)	In the past year (12 months), did you cut or stab someone else? In the past year (12 months), did you shoot a gun at someone else?	0.22/0.65

^aThe reported values represent the range of reliability scores across all years in the analysis

^bA series of five identical questions were asked about the respondent's relationship with his or her mother and father figure, with the pronoun (he/she) being the only thing that changed

^cThe variables that constitute the Contextual Safety scale were recoded so that higher scores on the scale correspond with higher levels of perceived safety

Analysis

Binary probabilistic growth curve modeling (GCM) was utilized to address our research question. For the analyses, a logistic mixed model (SAS PROC GLIMMIX) was performed, and full information maximum likelihood estimation was applied to account for missing data among the covariates. Furthermore, the covariance structure was assumed to be unstructured, and prior extensive analysis of the missing respondents within the dataset resulted in the conclusion that the data within the study can be considered to be missing at random (MAR).

Results

As indicated in Table 3, the likelihood of considering suicide increased as the child aged (OR 1.1787). Male adolescents experienced a lower risk of suicidal ideation

than their female counterparts (OR 0.6642), with that decreased risk, relative to females, becoming more pronounced over time (OR 0.9489). In addition to gender, all control factors were found to be influential, with the main effect (victim of violence), rate of change (hopelessness), or both values (self-worth, perpetrator of violence) resulting in a change in the risk of suicidal ideation.

Social support and social context had an important effect on suicidal thought. Though neither covariate exhibited a longitudinal effect, positive peer support and parental warmth were found to be significantly associated with our outcome, with greater amounts of positive peer support resulting in a slight increase in risk (OR 1.0273), while parental warmth exhibited the opposite effect (OR 0.9053). Sense of community was not found to predict suicidal ideation. The main effects of all contextual factors included in the model were found to be related to suicidal ideation, though only inevitability of violence varied over time. Increased perceptions regarding the inevitability of

Table 3 Longitudinal relationship between demographic, psychosocial, social support, and social context factors with suicidal ideation in low-income adolescents in Mobile, AL (USA, 1998–2011)

	Main effect		Rate of change	
	Coefficient	Odds ratio	Coefficient	Odds ratio
Level-2				
Male	– 0.4092*	0.6642	– 0.0524**	0.9489
Level-1				
Age	–	–	0.1644****	1.1787
Self-worth	– 0.1181****	0.8886	– 0.0186****	0.9816
Victim of violence	0.3179****	1.3742	– 0.0016	0.9984
Perpetrator of violence	0.3809****	1.4636	– 0.0242*	0.9761
Hopelessness	0.0399	1.0407	0.0209****	1.0211
Positive peer support	0.0269*	1.0273	– 0.0003	0.9997
Negative peer support	0.0185	1.0187	0.0025	1.0025
Parental warmth	– 0.0995****	0.9053	– 0.0057	0.9943
Sense of community	0.0203	1.0205	– 0.0045	0.9955
Inevitability of violence	0.1773****	1.1940	– 0.0151****	0.9851
Contextual safety	– 0.1408****	0.8687	– 0.0051	0.9949
Moved	0.2991*	1.3486	– 0.0296	0.9708
Additional interactions				
Self-worth * male	0.134****	1.1434		
Sense of community * male	– 0.0637***	0.9383		

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$; **** $p < 0.0001$

This model predicts suicidal ideation between ages 9 and 19, as a function of age 9

violence resulted in greater risk (OR 1.1940), though the effect of this covariate reduced as the adolescent became older (OR 0.9851). In line with the previous finding, those with higher perceptions of contextual safety experienced lower likelihood of suicidal thoughts (OR 0.8687). Finally, those children who reported relocating in the past year were 35% more likely to report having considered suicide.

In addition to the individual effects, we also explored the interaction between gender and self-worth, as well as sense of community. Both interactions were found to be significantly related, and operating in opposite directions. Holding self-worth constant, males are 14% more likely to consider suicide, while they are 6% less likely when keeping sense of community constant.

Discussion

The purpose of the present study was to determine the manner in which social support and perception of social environment impacted the risk of suicidal ideation among adolescents living in extreme poverty. Our results seem to reflect the findings from previous studies (LaVome et al. 2016; SAMHSA 2014; Joe et al. 2009), indicating that adolescent African-American females are at a greater risk than males. However, it is important to note that the incidence of reported suicidal ideation within the current study

is substantially higher than those found in existing research. While Joe et al. (2009) reported a 12-month incidence of 4.5% among African-American females and 2.1% among African-American males, the current study found a weighted 12-month incidence of 14.4% among females and 11.7% among males, with yearly rates ranging from 10.2 to 16.9% and 8.8 to 14.0%, respectively. The discrepancy between previously identified rates and the observed rates in the present study suggests that, while low-income adolescents may respond to social support and social context in a similar manner as the overall adolescent population, there is a much higher incidence of actual suicidal thought among impoverished children. The results also indicate that suicidal ideation increases as amount of victimization and perpetration of violence increases, which supports the findings of Lambert et al. (2008).

As for our primary research focus, the findings provide robust support regarding the importance of social context on suicidal ideation. Increased levels of perceived inevitability of violence were found to be associated with greater odds of suicidal ideation, which reflects the prevailing results in the existing literature (Bolland et al. 2005), suggesting that adolescents in extreme poverty in Mobile, AL, respond similarly to the presence of violence as adolescents in previous studies focusing on disadvantaged neighborhoods. A similar theory has been supported by Turner et al. (2012), who indicated that risk of suicidal

ideation is 2.4 times greater among youth who experienced peer victimization in the past year, 3.4 times greater among those who were sexually assaulted, and 4.4 times greater among those who experience maltreatment, relative to children who were not exposed to them. However, it is worth mentioning that the effect of the inevitability of violence, over time, was found to decrease by approximately 1.5%. While this is not a substantial effect, in and of itself, when one considers the logit nature of the relationship, and the span of 10 years, by the time the adolescent is 19 years old, the reduction in the observed main effect is quite notable. It is entirely possible that, due to the constancy of the violence within the neighborhoods, it ultimately becomes part of the everyday milieu. If this were the case, it would make sense that the effect of violence inevitability would be most detrimental for the younger children, as proposed by O'Leary et al. (2006), resulting in a gradual reduction in the effect of violence inevitability on suicidal ideation as the child ages. In addition to inevitability of violence, contextual safety was found to have a negative relationship with suicidal ideation, reflecting the findings of previous studies (Aneshensel and Sucoff 1996), while residential relocation resulted in a 35% increase in the odds of suicidal ideation, which mirrors the existing literature regarding the effect of 'social exit events' (Brausch et al. 2011).

Much like the results indicate an important role for social context, there is also evidence for the concurrent impact of social support. Specifically, positive peer support was found to increase the rate of suicidal ideation. Though this relationship may appear to be counterintuitive, existing theory proposes that increased support, among the impoverished, may lead to more negative outcomes (Kawachi 2006). Kawachi (2006) argues that those individuals with greater amounts of peer support are likely to be asked for assistance more often and more likely to feel obligated to provide assistance. Consequently, in an environment already burdened with high levels of hopelessness and depression, such obligations are likely to intensify their own sense of hopelessness and depression.

Parental warmth served as a protective factor, reducing the likelihood of suicidal ideation by nearly 10% for every one-unit increase. However, no longitudinal effect was observed. This effect, and non-effect, may result from the fact that the role of the parent often changes from being a supportive figure in the adolescent's younger years to being a disciplinarian and role model in the later years (Steinberg 1990). Consequently, due to the transition away from being a source of support, though maintaining a persistent presence and role in the adolescent's life, the impact of parental support remains static. Such findings suggest that the adolescents in the present study respond to parental support

in the same manner as the general adolescent population (Fotti et al. 2006; Kidd et al. 2006).

Lastly, Hooks (1989) stated that boys and girls in the Southern Black community are socialized to behave differently, with females raised to be 'seen and not heard.' The interactions between gender, and self-worth and sense of community were included to test this phenomenon. As self-worth increases, males are 14% more likely to consider suicide than their female counterparts. However, the reverse is the case for sense of community, where increasing sense of community results in a 6% decrease in likelihood of suicidal ideation among males compared females, which partially reflects the findings by Klemmer et al. (2017). One could argue that young females in the Southern Black community experience greater protective benefits due to their internal concept of self while drawing less validation from the community than their male counterparts. Such findings provide support to Hook's argument.

These findings provide insight into the role of important social factors on suicidal ideation within African-American adolescents residing in extreme-poverty communities. In doing so, the research begins to address numerous gaps in the existing literature. The present work is one of the few studies to include multiple measures of social support and environmental context in the interest of evaluating the manner in which the change over time in these factors impacts the incidence of suicidal ideation. Additionally, few of the existing longitudinal studies of adolescent suicidal ideation use a sample spanning the entire adolescent age range.

Given the above, it must be acknowledged that the current study has limitations. Due to the aforementioned selection criteria, nearly 46% of the available survey participants were eliminated. Still, the analysis consisted of 6687 participants, which remains a substantial sample size. Additionally, the MYS was conducted in a limited number of neighborhoods within a single metropolitan statistical area, selected based on their impoverished status. Due to such limitations, one must be cautious in generalizing the findings of the current study to the overall adolescent community, or even other urban-dwelling adolescent communities.

Recognizing the homogeneity of the sample as a potential shortcoming of the study, it can also be perceived as a strength. Many studies are forced to acknowledge that unmeasured factors associated with environment and socioeconomic status (SES) may contribute to their overall outcomes. However, within the present study, due to the homogeneity of the sample, there is very little variation in the environment or SES that must be accounted for. As such, we can be confident that our findings are not being

biased by any number of potentially unmeasured socioeconomic or environmental confounding factors.

Lastly, it must be acknowledged that the internal consistency of some of the measures is suspect. However, such issues are likely to result in type II error, opposed to type I error (false negatives, opposed to false positives). Consequently, if the low levels of internal consistency are indeed affecting the results, it is likely to manifest as a reduction in the reported effect of the scale on the dependent variable rather than an exaggeration. As such, the reported values of the scales in question are likely to be lower than the ‘true’ nature of the relationship. While this is problematic, it is not likely to result in a false report of significance.

The current research provides information regarding the nature of the relationship between social support and social context, which are two primary factors associated with social capital, and suicidal ideation, among extreme-poverty adolescents. Based on the findings, future longitudinal studies can hone their own focus and test the aforementioned findings within a more diverse sample. Additionally, recognizing the relationship between social support and social context on the accumulation of social capital, the present study provides a basis for a conversation regarding the applicability, and nature, of social capital within extreme-poverty communities. Lastly, the findings in the current study provide suggestive evidence that children within extreme-poverty communities experience suicidal ideation at a higher rate than the general population. Considering the relationship between suicidal ideation and suicide attempt, and recognizing that existing research has found an elevated risk of suicide attempt among impoverished children (Farrell et al. 2015), it may be beneficial for mental health professionals and prominent adult figures (teachers, religious leaders, etc.) to be more mindful of the elevated risk among the children in their community.

Compliance with ethical standards

Conflict of interest The authors declare that they have no conflict of interest.

Ethical approval Institutional review board (IRB) approval was acquired from Western Kentucky University (Ref#: IRB 14-219). All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki Declaration and its later amendments or comparable ethical standards. For this type of study, formal consent is not required.

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