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Diseases of Despair and Social Capital: Findings from a Population-Based Survey on Opioid Misuse among Adolescents

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ABSTRACT

Background: Deaths related to opioid overdose have increased substantially in the past few years, raising concerns about how to combat this public health emergency. *Objectives:* We investigated the association of family, school, and community social capital with opioid misuse in the adolescent population. In addition, we examined if adolescents' depressive symptoms have any mediating effects on opioid misuse. *Methods:* We used the 2018 National Survey on Drug Use and Health (NSDUH) data, and two substantive models with binary logistic regressions. Three social capital variables were added to the full model with control for sociodemographic and health status variables. A mediation analysis was estimated for family and school social capital, major depressive episodes in the past year, and opioid misuse. *Results:* We found statistically significant relationships between adolescent opioid misuse and family and school social capital. Adolescents' odds of opioid misuse decreased 10% with each additional family situation where they felt supported. Not knowing students in their grade who drank alcohol or used marijuana/hashish decreased the odds of misusing opioids 42% ($p < .01$). Experience of depressive episodes acted as a mediator for the social capital effects on adolescents' opioid misuse. *Conclusions:* Our findings lend support that opioid misuse is associated with despair, and therefore, opioid prevention programs need to incorporate strategies to address mental health issues as well. Our findings also underscore the need for focusing on increasing parental awareness and involvement as well as scaling up prevention efforts in high schools where substance abuse is relatively higher.

KEYWORDS

Opioid misuse; social capital; adolescent substance abuse; diseases of despair

Introduction

As life expectancy at birth in the United States has declined over the past few years, a recent CDC report identified drug overdose and suicide as the two key forces behind this decline. Between 2007 and 2017, drug-related deaths increased 108%, and suicides increased 35% among young adults, ages 18–34 (CDC, 2018). In 2016, 3.6% of adolescents aged 12–17 reported misusing opioids over the past year. A projection using population-based data (Chen et al., 2019) warns that if the opioid overdose crisis does not stabilize soon, the total number of opioid overdose deaths could reach as high as 1.21 million from 2016 to 2025. Premature deaths due to drug overdose is not only contributing to the drop of life expectancy, but they also exert harmful consequences on communities with lost productivity and health care costs. For example, in the United States in 2013, the total economic burden of fatal overdose and abuse and dependence of prescription opioids was estimated to be $78.5 billion (Florence et al., 2016).

Social epidemiologists, sociologists, and economists in particular have long been providing evidence that premature deaths and morbidities are symptoms of deeper social problems (Durkheim, 1951), and that deaths associated to these causes are suggestive of increased social disorganization or eroding social cohesion or social capital (Putnam, 2000). In public health literature, a new term has emerged in the last few years to describe these diseases, such as suicide and drug overdose related deaths as "diseases of despair" or "deaths of despair," which are believed to rise due to hopelessness (Case & Deaton, 2015). Although opioid misuse is a major public health concern, little is known on how social capital could explain opioid misuse and overdose, specifically in the adolescent population.

In health services research, social capital has mostly been operationalized as the property of neighborhoods or collective asset or public good (Macinko & Starfield, 2001; Moore et al., 2005) which has been measured by trust or civic participation. Through membership in associations and networks, people exchange information and receive support. The social network approach to social capital focuses on both the quantity and quality of social relationships and the resources which individuals mobilize through these ties (Moore et al., 2006). Since adolescence is a developmental phase of life, their positions and roles, relationships within family, school, and neighborhood domains—all could be part of their social capital that provides them opportunities

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and resources and shapes their attitudes and behaviors (Wright & Fitzpatrick, 2006).

Research shows that youths exposed to multiple sources of social capital, such as strong bonds with parents, positive social networks, and greater participation in community activities, are less likely to use substance (Åslund & Nilsson, 2013; Curran, 2007; Lardier et al., 2018), misuse alcohol (Brick et al., 2018), smoke tobacco (Koutra et al., 2017), or experience depressive symptoms (Hazel et al., 2014). Parental involvement and monitoring have been found to be associated with adolescent self-esteem, alcohol related norms (Donaldson et al., 2015), and perceived risks (Handren et al., 2016). A recent study in which researchers provided parents information about missed assignments, grades, and behavior on a weekly basis shows that the experimental group had significantly lower lifetime alcohol and marijuana use compared to the control group (Bergman et al., 2019). Individuals are likely to have higher odds of having an opioid use disorder (OUD) when they have lower parental monitoring (Piko & Kovács, 2010; Shakya et al., 2012), poorer parent-child interpersonal relations (Branstetter et al., 2011; Brown, 2013), and low childhood socioeconomic status (Gauffin et al., 2013).

School environment has also been shown to have influences on opioid misuse (Henry et al., 2012; Li & Lerner, 2011; Shih et al., 2010). A study on 6th through 12th graders in 44 high schools found that adolescents who perceived that more of their peers engaged in nonmedical prescription opioid use (NMPOU) were significantly more likely to endorse NMPOU (Egan et al., 2019). An increasing number of studies document that neighborhood characteristics can be a strong predictor of overdose deaths (Nesoff et al., 2020). A study on adolescents and youths' misuse of opioid found that adolescents who lived in neighborhoods with higher levels of social capital were less likely to report prescription drug misuse (Ford et al., 2017). Opioid misuse was also found to be high in economically disadvantaged zip codes where poverty and unemployment rates were high (Pear et al., 2019).

Despite the increase of information and research on opioid use and treatment, to date, no study examined opioid misuse in adolescents based on their access to social capital at family, school, and community levels (Blanco & Volkow, 2019). Since opioid misusers are often people who got the medication from a doctor or from a friend or family member, and not necessarily got addicted by using heroin or some other illegal drugs, its risk and protective factors could be different from other substance abuse problems (Schepis & McCabe, 2019). To fill this gap and to extend the literature, we examined the adolescent experience data from a population based national survey. We hypothesized that adolescents who have greater social capital at the family, school, and community level would be less likely to report opioid misuse. In addition, since opioid misuse is increasingly being described as "diseases of despair," this study examined if adolescent's depressive symptoms have any mediating effects on the opioid misuse.

Material and methods

Data

Data were drawn from the 2018 National Survey on Drug Use and Health (NSDUH), which is a nationally representative, cross-sectional household survey administered to civilian, noninstitutionalized people 12 years of age and older. The survey is sponsored by the Substance Abuse and Mental Health Services Administration (SAMHSA) and provides current annual information of the use of illicit drugs, alcohol, tobacco use, and other health related issues. NSDUH employs a stratified multistage area probability sampling technique, representative of the nation as a whole as well as each of the 50 states and the District of Columbia. Using probability-proportional-to-size sampling, from each state sampling regions, census tracts, census block groups, segments within census block groups, and dwelling units within segments were selected. A total final sample of 67,791 interviews were obtained with a weighted screening response rate of 73.30% and a weighted interview response rate of 66.56%; the overall response rate was 48.79% for people aged 12 or older. Further details on the survey methodology and construction are described elsewhere (SAMHSA, 2019). In our study, individuals were eligible for study inclusion if they were between the ages of 12 and 17 years ($N = 13{,}287$).

Study measures

Opioid misuse

NSDUH survey asked participants a series of questions to see if they had misused particular drugs in the past year, naming the drugs including heroin or the use of prescription pain relievers, such as hydrocodone, oxycodone, and morphine. From the responses of these questions, they recoded a new variable for opioid misuse. Misuse of prescription drugs has also been referred to in NSDUH as "nonmedical use." Misuse of prescription opioids has been defined as use "in any way a doctor did not direct you to use it/them." Examples of misuse provided to respondents include (a) use without a prescription of your own; (b) use in greater amounts, more often, or longer than directed; or (c) use in any other way not directed by a doctor. About 2.8% of adolescents in the sample responded "yes," to opioid misuse past year.

Major depressive episode (MDE)

Respondents were defined as having had MDE if they had at least one period of 2 weeks or longer in the past 12 months when they experienced a depressed mood, loss of interest or pleasure in daily activities, accompanied by problems with sleeping, eating, energy, concentration, or self-worth. The MDE questions are based on diagnostic criteria from DSM-5. In the sample, 14.6% said that they had experienced MDE in the past year.

Social capital indicators

In our study, we followed Coleman's (1990) conceptual definition of social capital, which has been employed in numerous public health and social science literature. According to Coleman (1990), social relations produce social capital by generating high levels of obligations and expectations, providing information potential, and generating norms and effective sanctions. The independent variables were three forms of social capital: family, school, and community.

Family social capital

According to Coleman (1988), children are strongly affected by the human capital, such as education or knowledge, possessed by parents only when parents are important part in their lives. Parent's physical presence and attention to children within families are pathways to productive adult role models which guide youths through a myriad of health and behavioral decisions (Wright & Fitzpatrick, 2006). In his earlier study (1988), Coleman defined family social capital as the relationships between parents and their children, which encompass the time, efforts, resources, and energy that parents invest in their children. Parents' communication of their rules and expectations to their children has shown to be associated with teens' decreased engagement in substance use (Curran, 2007). To create family social capital index, subsequent family capital literature commonly used indicators of quality of parent–child relations, adult's interest in the child, parents' monitoring of the child's activities and extended family exchange and support (Ferguson, 2006). We used three questions from the NSDUH survey that reflects these common indicators of family social capital. Adolescents were asked, during the past 12 months (a) how often did parents tell you that you have done a good job? (b) have you talked with parents about the dangers of tobacco, alcohol, or drug use? and (c) if in a serious problem do you feel you could turn to parents? The responses to (a) were coded 1 if they replied "always or sometimes," and 0 if they replied "seldom or never." Responses for (b) and (c) were coded "1" if the adolescent answered yes and "0" if indicated "no." We summed the recoded responses across the three items to create a "family social capital" index (Cronbach's $\alpha = .74$). Scores ranged from "0," indicating no tie or support, to "3," indicating support/tie/communication in all three items. Adolescents in the sample reported ties in an average of two items ($M = 2.0$, SD $= 1.1$); 52% said "yes" to all three items, indicating their parents support them and talk to them about the dangers of drugs and what to do when they are in serious trouble.

School social capital

Adolescents spend a significant amount of time in the school, and therefore school provides their access to social capital directly and indirectly. One commonly used school social capital indicator in adolescent substance abuse literature is peer influence which highlights that that connections to certain peer groups, more specifically to antisocial peers may function as 'negative social capital' for adolescents (Sletten, 2011; Villalonga-Olives & Kawachi, 2017). We assessed school social capital with two questions related to peer network and school environment (Cronbach's $\alpha = .73$). Participants were asked how many students in their grade they knew who (a) drink alcohol, and (b) use marijuana/hashish. Responses were reverse coded where we coded the responses as "1" if they said "none/few," and we coded "0" when they said "most/all." Higher scores in this index mean participants having peers in their networks with lower alcohol or substance problems.

Community social capital

We measured community social capital with the indicator participation in community-based events and activities. Participants were asked how many different kinds of community-based activities, sports, clubs, or groups have you participated in during the past 12 months? The responses 0 to 2 were dummy recoded as "0" = low participation, and 3–6 were coded as 1 = high participation. Higher score or "1" meant higher community capital.

Controls

Sociodemographic characteristics

Sociodemographic characteristics of interest in our study included age, gender, race/ethnicity, metropolitan statistical area, and family income. Participants in the sample were 49% female, 52% non-Hispanic white, 13.5% non-Hispanic black, and 22.7% Hispanic. Nearly 12% identified themselves as other races or of two races. About 57% of them had total family income less than $50,000. Most participants were from large metro areas (46%), while about 54% were from small metro or nonmetro areas. Based on the Core Based Statistical Area (CBSA) classifications provided by the Office of Management and Budget (OMB), the NSDUH defines segment in a CBSA with 1 million or more persons as large metro, segments in a CBSA with fewer than 1 million persons as small metro, and segments not in a CBSA as nonmetro areas. Health indicators included self-rated health, and illicit drugs or alcohol abuse. About 74% of the participants rated their health as good or excellent. Only about 2% of adolescents' reported drug and alcohol abuse in the past year. Illicit drug abuse included abusing any of the following substances: marijuana, hallucinogens, inhalants, methamphetamine, tranquilizers, cocaine, heroin, pain relievers, stimulants, or sedatives; and was not dependent on any of these substances.

Statistical analysis

All analyses were conducted using Stata 11 (StataCorp, Inc., College Station, TX). For the descriptive analysis, univariate percentage distributions of the variables in the study were used to show the characteristics of the sample, and bivariate percentage distributions and two-tailed χ^2 tests were used to show opioid misuse varied by each of the predictor and control variables in the study.

Table 1. Descriptive and bivariate statistics for variables in the analysis.[a]

Variables	Total or %	% Misused opioid past year
Outcome variable		
Opioid past year misuse[b]		
No	97.2	
Yes	2.8	
Independent variables		
Family social capital index ($\alpha = .74$)[c]	2.0 (1.1)	
0 of 3 capitals identified	8.8	5.1***
1 of 3 capitals identified	33.7	2.5***
2 of 3 capitals identified	5.5	6.3***
3 of 3 capitals identified	52	2.3***
School social capital		
Know students who drink alcohol/use marijuana	37.6	9.3***
Community social capital		
# Community activities participated	49.2	2.9
Major depressive episode past year (MDE)[d]		
No	85.4	2.2***
Yes	14.6	6.7***
Controls		
Age		
12–14 years old (ref)	49.1	1.9***
15–17 years old	50.9	3.8***
Gender		
Female (ref)	48.9	3.2**
Male	51.1	2.5**
Race/ethnicity		
Non-Hispanic White (Ref)	52.1	2.7
Non-Hispanic Black	13.5	2.9
Hispanic	22.7	3.1
Other	11.7	2.7
Annual family income		
≤50,000 (ref)	57.2	2.4***
>50,000	42.8	3.4
County type		
Small metro/Nonmetro (ref)	54.2	3.4**
Large metro	45.8	3.0**
Self-rated health		
Poor or fair (ref)	26.4	4.3***
Good or excellent	73.6	2.3***
Illicit drug/alcohol use past year		
No/unknown	98.0	2.5***
Yes	2.0	19.5***

[a] $N = 13{,}287$ youths aged 12–17 years.
[b] Misuse of prescription opioids has been defined as use "in any way a doctor did not direct you to use it/them." Examples of misuse provided to respondents include (a) use without a prescription of your own; (b) use in greater amounts, more often, or longer than directed, or (c) use in any other way not directed by a doctor.
[c] Count of responses to three questions on family relations, i.e., (a) how often did they tell you that you have done a good job? (b) talked with parents about the dangers of tobacco, alcohol, or drug use? and (c) if want to talk to about a serious problem they could turn to their parents. Higher score represents greater family social capital.
[d] A respondent was classified as having a major depressive episode (MDE) in the past 12 months if they reported experiencing at least five out of the nine criteria used to define an adult as having had MDE past year, where at least one of the criteria is a depressed mood or loss of interest or pleasure in daily activities.
*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$ (two-tailed χ^2 tests).

Two substantive models were estimated using binary logistic regressions since the dependent variable opioid misuse is a dichotomous variable (past year misuse responses yes vs. no). Model 1 examines the effects of the control variables. Model 2 adds social capital variables. One-tailed *p*-values are reported to reflect the statistical significance of effects. The goodness-of-fit of the two models was compared using deviance or likelihood ratio tests. Diagnostics indicated no problem with multicollinearity (i.e. tolerance values ranged from .53 to .99, all well above conventionally accepted cutoffs [e.g. Chatterjee et al. (2000, p. 240)].

Since in Model 2, only family and school social capitals were found to be significantly associated with opioid misuse, the mediation analysis was estimated only for these variables. We followed Baron and Kenny's (1986) regression based approach to mediation, which is commonly utilized in the social science literature. According to Baron and Kenny, for a variable to be considered as a mediator three conditions must be met: (1) path a: variation in the independent variable significantly accounts for variation in the proposed mediating variable; (2) path b: variations in the proposed mediating variable significantly accounts for variations in the outcome or dependent variable; and (3) path c:controlling for the effects of the mediating variable, a previously significant relation between the independent and dependent variables is reduced or no longer significant (Table 1).

As suggested by Baron and Kenny (1986), the three conditions that must be met to establish major depressive symptom as a mediator in this current study were: first, social capital variables (independent variable) must affect MDE (mediator) in the first equation (Step 1); second, MDE (mediator) must affect opioid misuse (dependent variable)

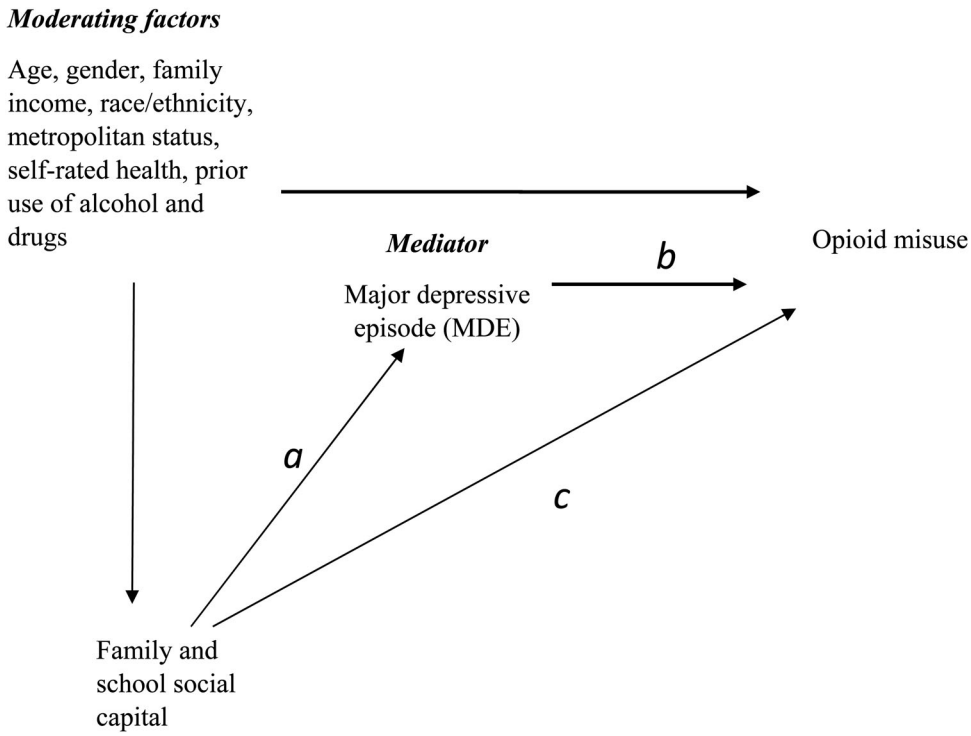

Figure 1. Major depressive episode (MDE) as a mediator of social capital on adolescents' opioid misuse.

in the second equation (Step 2); and third, social capital variables (independent variable) and MDE (the mediator) must affect opioid misuse (dependent variable) in the third equation, and the effect of social capital variables (independent variable) on opioid misuse (dependent variable) must be less in the third equation (Step 3) (see Figure 1). Three conditions of mediational effect met if (1) path a: variation in the independent variable (family and school social capital) significantly accounts for variation in the mediating variable (MDE); (2) path b: variations in the proposed mediating variable significantly account for variations in the outcome or dependent variable (opioid misuse); and (3) path c: controlling for the effects of the mediating variable a previously significant relation between the independent and dependent variables is reduced or no longer significant.

Results

Among the 13,287 adolescents aged 12–17 years, 2.8% reported misusing opioids in the past year. Table 2 shows the binary logistic regression results. Model 1 examined the effects of the individual SES and health characteristics. Age, family income, living in a small metro/nonmetro area, self-rated health, major depressive episodes, and drug or alcohol use in the past year had significant effects on opioid misuse. Adolescents ages 15-17 years were 78% ($100 \times$ [odds ratio – 1] = 100 *$\times$ [1.78 – 1] = 78%) more likely to misuse opioids ($p < .001$). Adolescents' odds of opioid misuse decreased 25% if their family income was more than $50,000 ($p < .01$). Adolescents living in large metro areas had 24% less likelihood of misusing opioids compared to their counterparts living in small or nonmetro areas ($p < .01$).Those who rated their health as good or excellent had 39% less likelihood of misusing opioids compared to their counterparts who rated their health as poor or fair ($p < .001$). Depressive symptoms had positive effects on opioid misuse. Adolescents who had at least one major depressive symptom (MDE) in the past year were 2.46 times more likely to misuse opioids compared to the adolescents who did not have any MDE ($p < .001$). Drug or alcohol abuse in the past year had the greatest effect. Adolescents who abused drugs or alcohol in the past year were 6.8 times more likely to misuse opioids compared to their counterparts who did not abuse alcohol or drugs ($p < .001$). Gender did not have any statistically significant association with opioid misuse. Race/ethnicity was not associated with opioid misuse either.

Model 2 added the social capital variables: family social capital, school social capital, and community social capital. The socioeconomic and health indicators that were significant in Model 1 remained significant in Model 2 as well. Among the social capital variables, family social capital and school social capital had significant effects on opioid misuse. With access to each additional family capital (index range 0–4), the odds of opioid misuse decreased by 10% ($p < .01$). School social capital was negatively associated with opioid misuse as well. Adolescents who reported not knowing students in their grade who drank alcohol or used marijuana/hashish were 42% less likely to misuse opioids ($p < .01$). Community capital was not associated with opioid misuse.

Table 3 presents the regression results for the mediational model for opioid misuse. All paths were statistically significant in the expected directions. In step 1, family and school social capitals were significant predictors of MDE. All else equal, family and school social capitals were inversely associated with MDE. In step 2, MDE was positively associated with opioid misuse. When controlled for sociodemographic

Table 2. Binary logistic regression models predicting past year opioid misuse among adolescents.[a]

	Misused opioid past year[b]			
	Model 1		Model 2	
Independent variables	*B* (*SE*)[c]	Odds ratio[d]	*B* (*SE*)	Odds ratio
Family social capital[e]			−0.11** (.05)	0.90
School social capital			−0.54***(0.13)	0.58
Community social capital			−0.01 (0.12)	0.99
Major depressive episode (MDE) past year	0.90*** (0.12)	2.46	0.83*** (0.13)	2.30
Controls				
15–17 years old (base: 12–14 years old)	0.58*** (0.12)	1.78	0.403*** (0.13)	1.50
Male (base: female)	−0.10 (0.12)	0.88	−0.18 (0.12)	0.91
Non-Hispanic Black (base: non-Hispanic White)	0.43 (0.18)	1.04	0.00 (0.19)	1.00
Hispanic (base: non-Hispanic White)	0.17 (0.22)	1.19	0.08 (0.23)	1.08
Other race (base: non-Hispanic White)	0.12 (0.20)	1.13	0.02 (0.21)	1.02
>$50,000 (base: ≤$50,000)	−0.28** (0.12)	0.75	−0.31** (0.12)	0.74
Large metro (base: Small metro/non metro)	−0.24** (0.11)	0.76	−0.27* (0.12)	0.78
Good or excellent (base: poor or fair)	−0.49*** (0.11)	0.61	−0.36***(0.12)	0.70
Drug or alcohol use past year	1.92*** (0.22)	6.80	1.75*** (0.18)	5.76
Constant	−3.63*** (0.25)	0.27	−2.97*** (0.27)	0.05
−2 log likelihood	2951.95		2773.44	

[a]$N = 13{,}287$ youths aged 12–17 years.
[b]Binary or dichotomous dependent variable (past year opioid misuse coded as yes vs. no).
[c]*B* (*SE*) = unstandardized logistic regression coefficient estimate (*B*) and its standard error (*SE*).
[d]Odds ratio = e^B.
[e]See Table 1 for details.
*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$ (two-tailed tests).

Table 3. Binary logistic regressions of the independent variables family social capital and school social capital on hypothesized mediator major depressive episode (Step 1), and major depressive symptoms (mediator) on opioid misuse (Step 2), and both social capital variables (independent variable) and major depressive episode (mediator) on opioid misuse (dependent variable) (Step 3) among adolescents,[a] 2018.

	MDE				Opioid misuse	
	Step 1		Step 2		Step 3	
	B[b]	Odds ratio[c]	*B*[b]	Odds ratio[c]	*B*[b]	Odds ratio[c]
Independent variables[d]						
Family social capital	*−0.21***	0.81	_____	_____	−0.10*	0.90
School social capital	*−0.56***	0.57	_____	_____	−0.54***	0.58
Major depressive episode	_____	_____	*0.90***	2.46	0.85***	2.33
Controls[b]						
15–17 years old (base: 12–14 years old)	0.44***	1.55	0.58***	1.78	0.41***	1.51
Male (base: female)	−1.14***	0.32	−0.13	0.88	−0.9	0.92
Non-Hispanic Black (base: non-Hispanic White)	−0.10	0.91	0.04	1.04	0.04	1.04
Hispanic	−0.58***	0.56	0.17	1.19	0.14	1.15
Other race	−0.18*	0.84	0.12	1.13	0.08	1.09
>$50,000 (base: ≤$50,000)	0.05	1.05	−0.28**	0.75	−0.30**	0.74
Large metro (base: small metro/non metro)	−0.17***	0.85	−0.27**	0.76	−0.25**	0.78
Health good or excellent (base: poor or fair)	−0.52***	0.60	−0.49***	0.61	−0.37***	0.69
Drug/alcohol use past year	0.74***	2.10	1.92***	6.80	1.75***	5.75
Constant	−0.13	0.88	−3.63***	.027	−2.99***	0.05
−2 log likelihood	8983.53		3028.21		2781.39	

[a]$N = 13{,}287$ youths aged 12–17 years.
[b]*B* (*SE*) = unstandardized logistic regression coefficient estimate (*B*).
[c]Odds ratio.
[d]See Table 1 for details.
*$p \leq .05$, **$p \leq .01$, ***$p \leq .001$ (two-tailed tests).

and health status related variables, with 1 percentage point increase of adolescents' report of depressive episode past year, the likelihood of adolescent opioid misuse increased by 0.90 points ($p < .001$). In Step 3, when controlled for socio-demographic and health status related variables and the independent variables (family and school social capital), with 1 percentage point increase of adolescents' report of depressive episode past year, the likelihood of adolescent opioid misuse increased by 0.85 points ($p < .001$). In Step 3, the mediator MDE was significantly and positively associated with opioid misuse and, in addition, the effects of social capital variables were slightly reduced. The effect of family social capital was reduced from −0.21 ($p < .001$) in Step 1 to −0.10 ($p < .05$) in Step 3. Similarly, the effect of social capital was reduced from −0.56 ($p < .001$) in Step 1 to −0.54 ($p < .001$) in Step 3. MDE, therefore, met all three of Baron and Kenney's (1986) conditions of mediation. First, both family and school social capital variables (independent variables) had significant effects on MDE (mediator) in the first equation (Step 1); second, MDE (mediator) had significant effect on opioid misuse (dependent variable) in the second equation (Step 2); and third, family and schools social capital variables (independent variables) and MDE (the mediator) had effects on opioid misuse (dependent

variable) in the third equation. In the third equation, the effects of social capital variables (independent variables) on opioid misuse (dependent variable) were slightly reduced but remained statistically significant (Step 3).

Discussion

Using a large nationally representative sample of on drug use and health in the United States, our results lends support that opioid misuse is associated with despair. Experience of depressive episodes acts as a mediator of the social capital effects on adolescents' opioid misuse. With decreased social capital, adolescents are more likely to report depressive episodes, which tends to result in higher opioid misuse. Our study also provides evidence of the influences of social capital on adolescents' opioid misuse. As expected, we found that higher family and school social capitals were associated with lower opioid misuse in adolescents.

Our finding that depressive episodes acts as a mediator of social capital's influence on opioid misuse is consistent with prior studies showing greater co-occurrence of opioids misuse among people with mental health issues (Substance Abuse and Mental Health Services Administration Use, & Office of the Surgeon General, 2018). Prior studies document that patients with mild, moderate, and severe depression were 1.9, 2.9, and 3.1 times more likely, respectively, to misuse their opioid medications by self-increasing their dose (Grattan et al., 2012). Some research, however, shows contradictory findings, such as while antisocial personality disorder was associated with prescription opioid (PO) misuse among youth injection drug-users, on the other hand, PO misuse, abuse and dependence were not associated with primary major depression, or with anxiety disorders other than post-traumatic stress disorders (Mackesy-Amiti et al., 2015). The mental health and opioids link may not be significant for those with problematic substance use disorders, but with general population the effects may change. Our study showed that among the general adolescent population, depressive episodes are not only a risk factor for opioid misuse, but can also mediate the effects of social and school capital on their risk of opioid misuse. This finding is important as it illustrates that efforts to stop the opioid crisis needs to address adolescent mental health issues.

Our finding that family capital is a predictor of opioid misuse is consistent with prior research that shows parent–child relationship quality may serve as a buffer against adolescents' substance use and risky behaviors (Bergman et al., 2019; Branstetter & Furman, 2013). When youths have trusted and open communication with their parents, it is possible that they feel less stressed and more supported, and trust any parental communications regarding dangers of drugs and alcohol, which in turn prevents them from engaging in health-risk behaviors. In our finding, the peer network at school was a strong predictor of adolescents' opioid misuse as well. Adolescence is a time when youths are strongly vulnerable to peer pressure and to conform to social norms shared by their peers (Curran, 2007). When alcohol and drug use is a common norm among other students in school, adolescents' perception of risks and acceptable behavior are shaped accordingly. The group norm becomes a strong influence on the individual.

Surprisingly, adolescents' participation in community activities did not have any association with opioid misuse. This was unexpected as studies in general document higher youth participation in community groups resulting in improved youth wellbeing (Aminzadeh et al., 2013). There may be two possible explanations. First, community involvement or sense of community belonging resulting from volunteering could be a long-term process, and the community feeling may take some time to develop, and therefore the positive influence may not be observed until later in their adulthood (Kim & Morgül, 2017). Second, for the adolescent population, participation in geographic community may be a weak construct to assess community capital. Instead, for them, digital status seeking may be a more important construct that could be associated with higher levels of engagement in health-risk behaviors. A recent study on a school-based sample of 716 participants found associations between participants' self-reported indices of social media use (such as likes, comments, and activity on one's posts), peer importance, and risky behavior engagement, such as, substance use, and sexual risk behavior (Nesi & Prinstein, 2019).

Among the socioeconomic risk factors, we found that adolescents living in low-income families or in small metro/non metro areas have greater risks of opioid misuse. This is consistent with prior research showing inverse association between adolescent health-risk behaviors and family income (Cobb-Clark et al., 2012). However, this study also shows that opioid misuse is associated with other health indicators, such as prior use of drugs or alcohol, or mental health status such as the experience of major depressive symptoms, and overall health status. Consequently, addressing the physical and mental health needs as part of youth opioid prevention efforts is important. The health care providers and pharmacists could help in curbing the opioid crisis if they become aware of the risk profile as suggested by our study that adolescents with prior substance and alcohol history and/or depressive symptoms are at greater risks of misusing prescription opioids.

Several limitations of this study should be noted. First, since we used responses on substance abuse collected from self-reports of youths, we cannot reject the possibility of social desirability response bias in the data (Meston et al., 1998). Second, our study was cross-sectional. Longitudinal dimensions should be considered in future studies. For example, the effects of adolescents being deprived of social capital in their early youth could have long-term effects such as opioid misuse at age 18 or later. Data shows that while 3.6% of adolescents ages 12–17 reported misusing opioids, this percentage was twice as high among young adults ages 18–25. Third, the association of poor self-rated health, major depressive episodes, or prior substance and alcohol use with opioid misuse may be due to common factors such as a lack of resources, including low family income that may compromise positive parenting, and a lack of school resources due to schools being in disadvantaged

communities. Further research is needed to explore the direct and indirect effects and interactions and paths through which these variables operate in the context of opioid misuse. Despite these limitations, the unique strength of our study is our large nationally representative sample, which increased generalizability of our findings.

Conclusions

The implications of our study are important as they can lead future research to focus toward the mental health and opioid misuse link. Opioid misuse prevention programs should incorporate mental health and wellness as part of the strategy. In addition, in our study, family and school social capitals appeared to be significant predictors of opioid misuse among adolescents. One of the Healthy People 2020 objectives is to increase the proportion of high school seniors never using substances—illicit drugs (ODPHP, 2019). While upstream actions are critical to combating the opioid crisis (NIDA, 2019), our findings point to the public health importance of focusing on resources, such as encouraging parent involvement with their adolescent children, and developing school-based interventions to create strong norms where drugs are considered taboos to the youths, specifically in schools with high proportions of students who use alcohol and drugs.

Declaration of interest

The authors declare that they have no conflict of interest. The authors alone are responsible for the content and writing of the article.

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