



## Multiple Mental Disorders and Suicidality; Cross-Ethnic Variation among Blacks

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### ARTICLE INFO

**Article type:**  
Original Article

**Article history:**  
Received: 25 May 2016  
Accepted: 28 September 2016  
Available online: 30 September 2016  
CJNS 2016; 2 (6): 10-19

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### ABSTRACT

**Background:** For psychiatric disorders, comorbidity is a rule rather than exception. Thus it is particularly important to study additive and multiplicative effects of multiple mental disorders on suicidal behaviors.

**Objectives:** The aim of this study was to investigate the ethnic differences in multiplicative effects of mental disorders on suicidal ideation among Black adults in the United States.

**Materials and Methods:** Data came from the National Survey of American Life, 2001-2003. For this study, we used data of 5,181 Black adults (3,570 African Americans and 1,621 Caribbean Blacks). Lifetime depression, anxiety, and drug abuse as well as suicidal ideation were measured, using the World Mental Health Composite International Diagnostic Interview (WMH-CIDI). Ethnic specific logistic regressions were used to determine multiplicative effects of anxiety, depression and drug abuse on suicidal thoughts among African Americans and Caribbean Blacks.

**Results:** Depression showed multiplicative effects with anxiety and drug abuse for African Americans, but not Caribbean Blacks. Drug abuse and anxiety showed multiplicative effects among Caribbean Blacks but not African Americans.

**Conclusion:** Based on our study, ethnicity modifies how anxiety, depression and drug abuse contribute to suicidality among Blacks. As suicide risk is differently influenced by multiple psychiatric disorders for African Americans and Caribbean Blacks, ethnic-specific programs for screening and prevention of suicide is suggested.

**Keywords:** Ethnic Groups; Suicidal Ideation; Depression; Anxiety

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➤ **Please cite this paper as:**

Assari Sh. Multiple Mental Disorders and Suicidality; Cross-Ethnic Variation among Blacks. Caspian J Neurol Sci 2016; 2(6): 10-19.

### Introduction

In industrial countries, mental disorders are stronger cause of suicide compared to social factors (1). The role of psychiatric disorders in increasing the risk of suicidal behaviors is known (2-9), as majority of individuals with suicidal ideation or attempt meet criteria for at least one mental disorder (10).

As comorbidity is a rule rather than exception when it comes to psychiatric disorders, it is particularly important to study additive and multiplicative effects of multiple mental disorders on suicidal behaviors (10). Unfortunately, whether the effects of multiple psychiatric

disorders are additive, synergistic, or sub-additive is still unknown (11-16).

Additive and multiplicative effects of mental disorders may depend on race and ethnicity (17-20). While for Whites multiple psychiatric disorders may have sub-additive effects (21-23), these effects seem to be synergistic for Blacks (15). Within Black race, there might be ethnic differences in the complex links between multiple mental disorders and suicidality (12-14). However, no previous study has compared ethnic groups of Blacks for multiplicative effects of psychiatric disorders.

Although most studies on psychiatric disorders and suicide have focused on major depressive disorder (24), other disorders such as anxiety and drug abuse also increase risk of suicidal behaviors (25-28). In general population of US adults, the number of mental disorders has been reported as the strongest predictor of suicidal behaviors (29).

Despite psychiatric disorders tend to be comorbid (11), most of the previous research on the association between mental disorders and suicidality have focused on separate effects of psychiatric disorders (10,24). There is very little information on multiplicative effects of multiple mental disorders on risk of suicidality (10,16). Thus, although we know several mental disorders increase the risk of suicidal thoughts, plan and attempt (2-9), it is not known how presence of one psychiatric disorder changes the effect of another (12-15).

Historically, suicide has been considered a public health problem for Whites but not Blacks (30,31). Suicide rate, however, are increasing for Blacks (32,33). There are even reports that suggest Blacks may experience similar incidence of suicidal attempts as Whites (34). As suicide may develop in earlier age among Blacks, time is more limited for suicide prevention for Blacks (35).

Unfortunately, limited information exists on suicidal ideation among Blacks with multiple mental disorders (12-15). Assari and colleagues showed that the effects of psychiatric disorders on suicidality among Black American adults depend

on ethnicity (13). In the pooled sample, ethnicity interacted with anxiety disorder and drug abuse effecting on suicide. Among African Americans, depression, anxiety, post-traumatic stress disorder and alcohol abuse and among Caribbean Blacks, however, depression and drug abuse disorder were linked to the risk of lifetime suicidal ideation. Authors concluded that while general anxiety disorder is a more important risk factor for suicidal ideation among African Americans, drug abuse may impose a larger risk for Caribbean Blacks (13). That study, however, was on the interaction between ethnicity and psychiatric disorders not multiplicative effects of psychiatric disorders across ethnic groups of Blacks.

Borrowing data from a nationally representative mental health survey of Black adults in the U.S., this study aimed to compare African-Americans and Caribbean Blacks for multiplicative effects of psychiatric disorders on suicidal ideation. Built on the differential effect hypothesis (17-20,36,37), the study is in continuation of our previous research on additive (14) and multiplicative effects (15) of mental disorders based on race, ethnicity, and gender (12-14).

## Materials and Methods

This study had a cross sectional design. Data came from the National Survey of American Life (NSAL). The NSAL is a national household survey of Black Americans who lived in the US. Methodology of the NSAL has been previously described (38).

### Participants

The NSAL study enrolled a nationally representative sample of 3,570 African Americans and 1,621 Caribbean Blacks. African Americans compose the largest portion of NSAL study. Sampling frame for African Americans was 48 states from households that contained at least one Black adult. The Caribbean Black sample was composed of two sub-samples. First included 265 samples collected from households within the

core sample. The second component included Caribbean Black samples who were collected from households within geographic areas with high Caribbean population (defined as metropolitan areas where Caribbean Blacks compose more than ten percent of the population) (38-40).

### **Interviews**

From all interviews, 86% of the interviews were conducted face-to-face using computer assisted interviewing, while the remaining 14% were at least partially conducted by telephone (38).

### **Mental disorders**

The following (lifetime) psychiatric disorders were measured based on the Diagnostic and Statistical Manual of Mental Disorders, Fourth Edition (DSM-IV): 1) major depressive disorder, 2) generalized anxiety disorder, and 3) drug abuse. We used the World Mental Health Composite International Diagnostic Interview (CIDI) for our purpose. The CIDI diagnoses are believed to be “consistent” with diagnoses based on a clinical research diagnostic interview (Structured Clinical Interview) (41).

### **Suicide ideation**

Outcome was lifetime serious suicide ideation, measured using the following single item: “have you ever seriously thought about suicide?” All participants could refuse to answer this question (12-15,17-19,42,43).

### **Socio-demographic factors**

This study collected data on age (continuous variable), gender (female and male [reference category]), as well as region (Northeast [reference category], Midwest, South, and West). The following socio-economic factors were also measured: education (ordinal variable; Less than 12 years [reference category], 12 years, 13-15 years, and More than 15 years), marital status (categorical variable; Married [reference

category], Divorced/ separated/ widowed, and Never married), and employment (a three level categorical variable [reference category]; Employed, Unemployed, and Not in labor market). e level categorical variable [reference category=employed].

### **Moderator**

Ethnicity was either African American or Caribbean Blacks. Caribbean Black was defined as meeting at least one of the following three criteria: 1) being of West Indian or Caribbean descent, 2) being from a country located in the Caribbean region, or 3) having parents or grandparents born in a country within the Caribbean region.

### **Statistical analysis**

Stata-13 (Stata Corp., College Station, TX, USA) was used for data analysis, due to complex sampling used in the NSAL study. We used Taylor series linearization to estimate standard errors. Sub-population survey logistic regressions were used for multi-variable analysis in each ethnic group. In all models, serious suicide ideation was the main outcome, mental disorders were the predictors, and socio-demographics (i.e., age, gender, education level, employment, marital status and country region) were control variables. Multi-co-linearity between the independent variables was ruled out. First, we ran ethnic-specific logistic regressions without interaction terms. In the next step, we fitted ethnic-specific logistic regressions with all (n=3) two by two interactions. We kept the main effects in the model even if they were not statistically significant. Odds ratio and 95% CI were reported.

## **Results**

Most African Americans and Caribbean Blacks did not meet criteria for any mental disorder(s) included in this study. Table 1 presents descriptive statistics based on ethnicity.

**Table 1.** Descriptive statistics based on ethnicity

	African Americans (n=3,570) N (%)	Caribbean Blacks (n=1,621) N (%)
<b>Gender</b>		
Male	1,271 (44.02)	643 (50.87)
Female	2,299 (55.97)	978 (49.13)
<b>Marital status</b>		
Married/partner	1,222 (41.65)	693 (50.15)
Widowed, separated, divorced	1,164 (27)	385 (18.93)
Never married	1,176 (31.57)	543 (30.91)
<b>Mean (SD)</b>		
Age	42.32 (14.49)	40.27 (5.77)
Education (Years)	12.43 (2.23)	12.88 (1.01)
Annual Income (USD)	36,833 (33,068)	47,044 (15,190)
These descriptions are previously reported elsewhere. (12-15) SD; Standard Deviation		

**Additive effects**

Among African Americans, depression (OR=4.00), anxiety (OR=2.56), and drug abuse (OR=2.04) were positively associated with odds of lifetime suicidal ideation. Among Caribbean

Blacks depression (OR=5.11) and drug abuse (OR=19.72) but not anxiety were positively associated with lifetime suicidal ideation (Table 2).

**Table 2.** Additive effects of mental disorders on suicidal ideation among African Americans and Caribbean Blacks

	African Americans (n=3,570)		Caribbean Blacks (n=1,621)	
	OR	95% CI	OR	95% CI
Age	0.98	0.97-0.99	0.98	0.96-1.00
<b>Gender</b>				
Men	ref		ref	
Women	1.18	0.88-1.57	1.50	0.76-2.96
<b>Education</b>				
Less than 12 years	ref		ref	
12 years	0.95	0.64-1.41	1.58	0.69-3.60
13-15 years	0.77	0.49-1.20	1.38	0.40-4.69
More than 15 years	0.75	0.49-1.17	1.26	0.52-3.05
<b>Employment</b>				
Employed	ref		ref	
Unemployed	1.68	1.19-2.37	0.51	0.17-1.53
Not in labor market	1.31	0.88-1.95	0.97	0.38-2.46
<b>Marital status</b>				
Married	ref		ref	
Divorced/ separated/ widowed	1.18	0.80-1.74	0.66	0.23-1.91
Never married	0.76	0.54-1.06	2.71	1.29-5.68
<b>Region</b>				
Northeast	ref		ref	
Midwest	0.76	0.45-1.29	3.02	0.67-13.66
South	0.66	0.41-1.06	1.81	0.60-5.40
West	0.93	0.34-2.55	1.88	0.57-6.19
<b>Depression</b>	4.00	3.05-5.25	5.11	2.11-12.42
<b>Drug abuse</b>	2.04	1.20-3.47	19.72	4.06-95.72
<b>Anxiety</b>	2.56	1.44-4.58	0.23	0.05-1.13

**Multiplicative effects**

Multiplicative effects of depression and anxiety were only found for African Americans. Multiplicative effects between drug abuse and

anxiety were only found among Caribbean Blacks. Drug abuse and depression showed multiplicative effects among African Americans (Table 3).

**Table 3.** Multiplicative effects of mental disorders on suicidal ideation among African Americans and Caribbean Blacks

	African Americans (n=3,570)		Caribbean Blacks (n=1,621)	
	OR	95% CI	OR	95% CI
<b>Age</b>	0.98	0.97-0.99	0.98	0.96-1.00
<b>Gender</b>				
Male	ref		ref	
Female	1.18	0.88-1.58	1.74	0.86-3.52
<b>Education</b>				
Less than 12 years	ref		ref	
12 years	0.95	0.64-1.41	1.58	0.79-3.14
13-15 years	0.76	0.49-1.18	1.40	0.56-3.48
More than 15 years	0.71	0.45-1.13	1.22	0.46-3.24
<b>Employment</b>				
Employed	ref		ref	
Unemployed	1.65	1.15-2.36	0.73	0.26-2.06
Not in labor market	1.29	0.87-1.90	1.09	0.45-2.66
<b>Marital status</b>				
Married	ref		ref	
Divorced/ separated/ widowed	1.14	0.78-1.66	0.65	0.23-1.88
Never married	0.76	0.54-1.05	2.52	1.01-6.29
<b>Region</b>				
Northeast	ref		ref	
Midwest	0.78	0.48-1.27	3.07	0.84-11.24
South	0.66	0.43-1.03	1.93	0.70-5.31
West	0.94	0.35-2.53	2.19	0.69-6.90
<b>Depression</b>	0.68	0.23-2.01	0.52	0.04-6.77
<b>Drug abuse</b>	3.07	1.81-5.21	41.35	7.10-240.81
<b>Anxiety</b>	2.27	0.59-8.70	0.06	0.00-0.95
<b>Anxiety × Depression</b>	3.46	1.13-10.55	3.65	0.38-35.36
<b>Anxiety × Drug abuse</b>	2.65	0.80-8.75	9.63	5.97-16.60
<b>Depression × Drug abuse</b>	2.22	1.17-4.22	3.46	0.23-52.69

## Discussion

Current study showed that multiplicative effects of mental disorders on suicidal ideation among Black adults depend on ethnicity. Depression has multiplicative effects with drug abuse and anxiety among African Americans, while drug abuse and anxiety interacted among Caribbean Blacks.

Assari and colleagues have shown that number of psychiatric disorders has a dose-dependent effect on the first age of development of suicidal ideation among Black adults in the US (12). The study showed that among Blacks, suicidal ideation was found to start at a lower age among Blacks with two or more mental disorders, compared to those with one disorder (12). In another study by Assari, number of psychiatric disorders was an independent risk factor for odds of suicidal ideation, an effect which was independent of ethnicity and gender (14).

Although we know that suicide rates vary among the ethnic groups (44-46), very few studies have explored how risk factors of suicide among

Blacks vary based on ethnicity (12-14,42,43). Given that the foreign-born share of the Black American population rose from 1% to 8% between 1960 and 2005 and immigration contributed 20% of the growth of the US black population between 2000 and 2006 (47), it is important to examine the impact of ethnicity on the patterns of suicidal behavior among black Americans if we are to develop effective intervention strategies.

Nationally representative studies have suggested that risk of suicidal behaviors among Blacks depend on ethnicity (15,24). Among adults, 7.5% of Caribbean black men reported lifetime suicide attempt, while the rate was 4.1% among African American men (15). Joe and colleagues have found that Blacks with mental disorders were eight times more likely to attempt to suicide than those without psychiatric disorders (42). Joe and colleagues have shown that African Americans are five times more likely to attempt to suicide compared to their Caribbean Blacks counterparts (45,46). In a study by Assari and

colleagues, additive effects of depression, anxiety, posttraumatic stress disorder, drug abuse and alcohol abuse increased the risk of suicidality among Black adults (13). No previous studies had tested the multiplicative effects of mental disorders on suicidality among ethnic groups of Blacks.

We found that ethnicity alters multiplicative effects of psychiatric disorders on suicidal thoughts among Blacks. In a study by Assari and colleagues (13), Caribbean Blacks and African Americans differed in the additive effects of mental disorders on risk of suicidal behaviors. While among African Americans, depression, anxiety, posttraumatic stress disorder and alcohol abuse were associated with the risk of suicidal thoughts, only depression and drug abuse predicted risk of suicidal thoughts for Caribbean Blacks (13).

While in our study effects of multiple psychiatric disorders among ethnic groups of Blacks were synergistic (27), previous studies have reported “sub-additive effects” among other ethnic groups such as Whites (16). Such “sub-additive effects” have been attributed to redundancy in risk for suicide with different psychiatric disorders, as many mental disorders overlap in etiology and phenotype (16-18). For Blacks, however, mental disorders are more chronic and disabling (40), thus they may show synergistic effects (15).

It has been shown that psychiatric disorders have does effects on suicidal ideation (14,41,48,49). However, ethnic differences in the multiplicative effects of anxiety, depression and drug abuse on suicidality of among Blacks are still unknown. The current study extends the literature and suggests that pattern of comorbidity of anxiety, depression, and drug abuse has implication for suicidal ideation, and such effect depends on ethnicity.

The results are very important because mental disorders are the strongest risk factors of suicide in countries such as US (50-53). Up to 98% of people who commit suicide meet criteria for at least one mental disorder. From various

psychiatric disorders that increase risk of suicide, depression and drug use account for 30% and 18% of cases of suicides, proportions that are higher than other conditions (54,55). Unique contribution of this study is showing that among ethnic groups of Blacks, the effect of depression, anxiety, and drug use on suicide depend on presence of other mental conditions.

It is not known what causes ethnic differences regarding the effect of psychiatric disorders on suicide. Ethnic differences may be due to the variations in culture, values, socio-historical experiences, socioeconomics, support system, or access to care, that all potentially influence distribution of suicide and suicidal ideation (48). One study has suggested that psychiatric conditions may differently influence hopelessness (56), which is a main predictor of suicide (57).

In a study, Assari and colleagues (13) argued that screening of anxiety and drug abuse may be more important for suicide prevention among African Americans and Caribbean Blacks, respectively. This is in line with a study that has shown anxiety and depression differently influence self-rated mental health of African Americans and Caribbean Blacks (18). Based on the results of current study, suicide prevention programs among Blacks may benefit from tailoring based on ethnicity. Screening for comorbid psychiatric disorders among Blacks who have suicidal ideation may be different for African Americans and Caribbean Blacks. In the presence of drug abuse, comorbid depression among African Americans and comorbid anxiety among Caribbean Blacks may be more important for detection of suicide. So, ethnicity should inform design and implementation of suicide programs (49).

This study had at least four limitations. First, validity of single item measures of suicidal ideation is not known. Validity of such measures may also depend on ethnicity. Participants with high level of stigma may underreport suicidal thoughts, so the outcome may have different misclassification bias based on ethnicity. Second, cross-ethnic comparability of diagnoses of

psychiatric disorders such as anxiety, depression and drug using the Composite International Diagnostic Interview is unknown (41). Third, due to using a cross-sectional design, we cannot interpret the associations to be causative. There is still a need for additional research on the complex associations between race, ethnicity, culture, social class, mental disorders, and suicide. Research should explore if culture explains ethnic-specific interactions between psychiatric disorders on suicidal ideation.

Although our findings showed ethnic-specific multiplicative effects of mental disorders on suicidality of Blacks in the United States, a large number of individuals with suicidal behaviors may only have one psychiatric disorder. Thus, our findings should not undermine importance of suicide screening and prevention for individuals with a single psychiatric disorder. However, suicide risk is greatest among Blacks who meet criteria for more than one psychiatric disorder. We also suggest closer suicide monitoring of Blacks who endorse criteria for multiple mental disorders.

## Conclusion

Multiplicative effects of depression, anxiety, and drug abuse on suicidal ideation of Blacks may depend on ethnicity.

## Acknowledgments

SA is funded by the Heinz C. Prechter Bipolar Research Fund and the Richard Tam Foundation at the University of Michigan Depression Center.

## Conflict of Interest

Authors have no conflict of interest.

## Funding

The National Survey of American Life (NSAL) is funded by the National Institute of Mental Health (NIMH; U01-MH57716) with supplemental support from the Office of Behavioral and Social Science Research (OBSSR)

and the National Institute on Drug Abuse (NIDA) at the National Institutes of Health (NIH) and the University of Michigan.

## Authors Contributions

SA was responsible for the design, analysis of the data, drafting the manuscript.

## Disclosure

This paper is an extension of paper “Synergistic Effects of Lifetime Psychiatric Disorders on Suicidal Ideation among Blacks in the USA”.<sup>(27)</sup> As this is a secondary analysis of a national survey, some similarities in the Methods section of the paper. The reason is that more than 300 peer review papers have been published from this survey. Public data was downloaded from The Interuniversity Consortium for Political and Social Research (ICPSR), Institute for Social Research (ISR), University of Michigan.

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