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Education, Perceived Discrimination and Risk for Depression in a Southern Black Cohort

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Abstract

Objectives.—Assess whether education moderates associations between discrimination and depression risk within a southern Black/African American cohort in a labor market shifting from manufacturing and farming to education-intensive industries, such as health care and technology.

Methods.—Data are from the Pitt County (NC) Study (n=1154) collected in 2001. Depression risk was assessed with the Center for Epidemiologic Study-Depression (CES-D) scale. Discrimination was measured using a subset from the Everyday Discrimination Scale. Education was categorized as completion of less than high school (HS), HS/GED (General Educational Development), or any college.

Results.—Completing any college mitigated the association between discrimination and CES-D among men (b=−1.33, 95% CI =−2.56, −0.09) but not women (b=−0.19, 95% CI =−1.36, 0.98).

Conclusions.—Education is protective for depression risk related to discrimination for men but not women. Recent macroeconomic changes placed a premium on higher levels of education in 2018, as in the 1990s. Because racial discrimination remains a stressor in the everyday lives of African Americans regardless of education level, the health benefits of higher education for working-aged African Americans in shifting labor markets warrants further investigation.

Keywords

Depressive symptoms; discrimination; education; African Americans; economic growth

Depression is a major social and economic burden in the United States. According to findings from the National Survey on Drug Use and Health (NSDUH), depression prevalence increased among adults 50+ from 2005–2015 (Weinberger et al., 2018), and past year major depressive episodes affected nearly 5.2 million U.S. adults aged 50+ in 2017 (Substance Abuse and Mental Health Services Administration, 2018). The economic burden of depression was estimated at \$210.5 billion by 2010 (Greenberg, Fournier, Sisitsky,

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Pike, & Kessler, 2015). Demographic differences persist in depression burden as well. Women aged 50+ have a higher prevalence of depressive symptoms than men (Federal Interagency Forum on Aging-Related Statistics, 2016), and NSDUH data also identified increases in depression prevalence for adults with some college and college graduates from 2005–2015. Recent epidemiologic studies show comparable depression rates among African Americans and the general population (Brody DJ, 2018; National Institute of Mental Health, 2019), but African Americans have lower depression treatment rates (American Psychiatric Association, 2017; Substance Abuse and Mental Health Services Administration, 2015; U.S. Department of Health and Human Services, 2017) and suffer greater depression-related disability compared to Whites (Bailey, Patel, Barker, Ali, & Jabeen, 2011; Williams et al., 2007). This set of findings suggests different exposure and experiences of depression across demographic and socioeconomic groups.

In this study, we examine the associations of depressive symptoms and discrimination among African American adults across demographic and socioeconomic groups from Pitt County, NC. Racial discrimination has been identified as a correlate of poor mental health in racial/ethnic minority populations, including African Americans. Our study setting, Pitt County, represents a community in which there were significant macroeconomic shifts; we posit that one way in which these shifts influence the residents is through simultaneous influence on their socioeconomic status, interpersonal and social experiences, and health. Findings from research on intersectionality suggests that health experiences may be shaped by the multiple social identities an individual has, and in particular, that the most historically marginalized subgroups are more likely to experience discrimination along multiple dimensions (Schulz et al., 2006). Marginalized populations are also more likely to report experiences of discrimination as they encounter non-traditional social settings, including employment settings. The recent economic shifts in Pitt County shifted the industries and employment opportunities for the county residents, creating opportunities for upward socioeconomic mobility (especially for vulnerable populations) through education, but perhaps weakening socioeconomic stability for employees of industries exiting the county.

Discrimination and Health

Discrimination is negatively associated with health, including depressive symptoms (Assari et al., 2015; Hudson et al., 2013; Keith et al., 2010) and other health outcomes (Shin, Soltero, Mama, Sunseri, & Lee, 2017). Higher education among African Americans has been shown to be associated with increased exposure to (perceived) racial discrimination (Dailey, Kasl, Holford, Lewis, & Jones, 2010), but we know little about how higher levels of education might protect against poor mental health in a Southern Black population exposed to recent rapid changes in the macro-economy. Discrimination, or the perception of mistreatment based on some personal characteristic, is experienced by individuals across population subgroups differentially. In a recent 2015 study, English and colleagues examined a sample of 505 African Americans in the US and reported higher levels of discrimination were associated with more depressive symptoms. Intersectionality literature suggests that at a minimum, age, race, gender, and socioeconomic status jointly determine the experience of an individual, and further determine how they are perceived and treated by other individuals (Keith, 2010). English and colleagues also reported that older adults and men were more

likely to report experiencing discrimination, and that older adults and women had a higher prevalence of depressive symptoms (English, Lambert, Evans, & Zonderman, 2015). The experience of discrimination may be a function of membership to a combination of social identities (e.g., defined by gender, age, and race/ethnicity) rather than any single identity. The culture of the social context may additionally influence the likelihood that the social identities are targets for discrimination, particularly for population subgroups that adopt new roles and gain access to resources, including education and employment in new industries. Internalizing these discriminatory actions as stressors that occur because of the social context and the intersectional identities may result in a higher risk of depressive symptoms (English et al., 2015; Shin et al., 2017).

Education and Health

Education is generally protective against poor mental (Ross & Mirowsky, 2006) and physical health (Hahn & Truman, 2015). However, the benefits associated with higher education also increase exposure to discriminatory experiences for historically marginalized populations (Keith et al., 2010). Further, the protective effects of education may vary by labor market and employment industries. For example, in urban and diverse areas that rely on non-manual labor markets, higher education is expected to increase opportunities for well-paid employment across population subgroups. In more rural areas, however, and especially in those for which manual labor historically has been associated with reasonably adequate income, the health returns on higher levels of education may be limited. The returns to education, then, may be dependent on the potential for adequate income from employment within a given social context.

Social Context: Pitt County, NC

This study examines education, discrimination, and depressive symptoms in the Pitt County (NC) Study (PCS), a community-based study of mental and physical health outcomes in a Southern African American population. The PCS occurred during a period of significant transition and growth in the industrial diversity of Pitt County, and represents significant periods of community change and expected economic growth that would ideally benefit the collective community. Throughout the 1990s, there were significant economic changes that increased the importance of education for stable employment opportunities throughout the United States, and particularly in rural geographies like Pitt County. According to the Pitt County Development Commission (2012), Pitt County was largely an industrial and farming community that began to experience growth in health and technology related industries during the 1990s. By the mid 1990s, the number of technology (e.g., IC Harness Technologies, Research Triangle Institute) and pharmaceutical employers increased, along with a growing number of textile, product, and plastics manufacturers. This growth accompanied county-wide initiatives to (1) create a technology-based business incubator and (2) expand the presence of East Carolina University (ECU) as the major area academic institution with a medical school. Pitt County Memorial Hospital is the area's major hospital that expanded in size during the early 2000s. As of 1990, education was gaining value, and the community invested in the Pitt Community College bond, and by the mid 1990s, interest

in advanced education in the community was accelerated by ECU's success with a \$50 million funding drive.

Despite the well-known macroeconomic changes affecting communities like Pitt County, NC, and particularly how such shifts contribute to health inequities, this is the first study, to our knowledge, to examine the confluence of education and discrimination in relation to mental health particularly among African American adults in a community with recent community-wide macroeconomic shifts. This study examines the moderating effect of education on the hypothesized negative association between perceived discrimination and depressive symptoms in a sample of working age, Southern African Americans.

Methods

This cross-sectional study uses data from the 2001 follow-up interviews of participants in the Pitt County Study of North Carolina. The Pitt County Study was initiated in 1988 as a probability, community-based investigation of risk factors for hypertension and related disorders among black men and women residing in eastern North Carolina (S. James, VanHoewyk, Belli, Strogatz, & Williams, 2006). Participants were 25 to 50 years old in 1988. Middle-class neighborhoods were over-sampled to increase variation in socioeconomic position (SEP). The baseline sample, the sampling strategy, and the content of the baseline household interview are described in detail elsewhere (Curtis, James, Raghunathan, & Alcer, 1997). This study was approved by the Duke University Institutional Review Board.

We conducted cross-sectional analyses for this study. Although there are available data from 1988, we explored the hypothesized relationships but carefully considered ways in which the recent social context may have shaped the study variables, particularly for a cohort of Southern African Americans in a rural-but-changing community. We suggest that longitudinal changes in the associations of interest are confounded by additional factors (e.g. federal policies, familial resources, etc) that are beyond the scope of this study but important to address in future work.

Study Participants

The data for this study represent the middle-aged African American adults who were interviewed in the 2001-wave and in the original sample in 1988. A total of 1773 adults were interviewed in 1988 (80% response rate; 661 men and 1112 women); 1221 were re-interviewed in 2001 (69% response rate; 428 men and 793 women). The 2001-wave participants were from all participants believed to be alive, non-institutionalized, and residing within a 100-mile radius of Greenville, North Carolina, the county's largest city. Our analytic sample used response data from the 1154 people from 2001 with non-missing data.

Study Measures

Depressive symptoms were measured using an abbreviated 11-item version of the Center for Epidemiologic Studies-Depression (CES-D) scale (Cronbach's $\alpha = 0.72$)³. The scale assessed how frequently (never (0), hardly ever, some of the time, most of the time (3))

respondents indicated the following: I felt depressed, I felt that everything I did was an effort, My sleep was restless, I was happy, I felt lonely, People were unfriendly, I enjoyed life, I did not feel like eating/My appetite was poor, I felt sad, I felt that people disliked me, and I could not get 'going'. Positively worded items were reverse coded, and the CES-D scores were calculated as the sum of the response scores (range=0–33). Higher scores indicated more depressive symptoms.

Discrimination was measured using a 6-item subset the Everyday Discrimination Scale. Response items included: You are treated with less courtesy or respect than other people, You receive poorer service than other people at restaurants or stores, People act as if they think you are not smart, People act as if they are afraid of you, You are called names or insulted, and You are threatened or harassed. Response categories included almost everyday (5), at least once a week, a few times a month, a few times a year, and less than once a year, and never (0). Discrimination scores were calculated as the average of the item response scores. Higher scores indicated more reported experiences of discrimination. Perceived sources for reports of discrimination were not examined in these analyses.

Education was analyzed using categories reflective of the highest level of schooling completed, including trade or vocational school or college, in 1988. Respondents were asked if they completed graduate or professional school, the number of years completed in college (1–4 years), trade/vocational school (1–3 years), whether they completed a GED, or the number of years completed in grade school (0–12 years). For this study, the education data were categorized as the completion of less than high school (0–11 years), high school/GED (12 years completed or GED completed), and any college to include some college (includes any trade/vocational school or 1–3 years of college) and completed college (4 years college completed or graduate/professional school completed).

Potential confounders addressed in the analyses included age, level of physical activity, smoking status, marital status, and perceived stress (Fowler-Brown et al., 2009; S. A. James et al., 1998).

Statistical Analysis

Means, standard deviations, and independent two sample t-tests were used to examine and compare the continuously measured sample characteristics by gender. Frequencies and proportions were calculated for the categorical measures and compared by gender using chi-square tests. Three sets of logistic regression models were employed to examine the associations of interest. Bivariate models of the associations between discrimination and depressive symptoms were performed. Multivariable models were performed to examine the associations between discrimination and education with depressive symptoms, controlling for the relevant confounders. Education-discrimination interaction models, controlling for the confounders, were then employed to examine the moderating role of education on the association of interest. Lastly, gender-stratified models were used to more closely examine the associations between discrimination and depressive symptoms within genders. While the distribution of the CES-D score was notably right skewed, results were unchanged with a natural log transformed CES-D measure; we therefore present models with untransformed CES-D scores consistent with previous studies. We performed sensitivity analyses using 4

categories of education as well in which some and completed college were separated as previous research has shown differential associations of college completion with health outcomes (Zajacova, Rogers, & Johnson-Lawrence, 2012). The statistical analyses were weighted to account for the oversampling of middle class households in 1988 and nonresponse to both the 1988 and 2001 surveys. All analyses were performed using SAS software (version 9.3; SAS Institute, Inc., Cary, NC).

Results

The sample had an average age of approximately 36 years in 1988 (49 years in 2001), and a greater proportion of men compared to women were married, physically active, and smoked. The majority of the sample completed high school or less. CES-D scores were comparable for men and women; however, men had higher discrimination scores than women, while women reported higher stress levels than men.

Higher discrimination ($b=1.84$, 95% CI = 1.51, 2.17) and completing less than high school were both significantly associated with higher CES-D scores, controlling for age, marital status, gender, physical activity smoking status, and reported stress scores (Table 2, Model 1). Model 2 showed no statistically significant interaction terms for education and discrimination in relation to CES-D. In sensitivity analyses, we also examined the consistency of the results with education measured in four rather than three categories; the association between discrimination and CES-D was mitigated for respondents with a completed college degree but not for respondents who completed some college (data not shown).

Our gender-stratified models that include the interactions of education and discrimination in relation to CES-D are shown in Table 3. Higher education is inversely related to CES-D for women, and attending any college mitigates associations between discrimination and CES-D for men but not women. Looking across gender-education stratified models (Tables 4 and 5), higher perceived discrimination was associated with higher CES-D scores in each strata, with graded associations for men and among women, finding that the point estimates for discrimination were largest for women with HS/GED completion, followed by women who completed less than HS; CES-D scores were least affected by discrimination for women who completed any college.

Discussion

Our study findings of significant associations between discrimination and depressive symptoms are consistent with previous research among racial/ethnic minorities and mental health (Borrell, Dallo, & White, 2006; Finch, Kolody, & Vega, 2000; Kessler, Mickelson, & Williams, 1999; Noh & Kaspar, 2003). This work developed from an examination of literature on intersectionality, which theorizes that more marginalized groups may face discriminatory experiences more frequently than other population subgroups, and thus be more likely to have poorer mental health exacerbated by the experience of more chronic stressors like discrimination. Our work denoting differences in the association across education level adds to the literature that examines interactive relationships between

education and perceived discrimination in relation to depression outcomes in the context of a changing economy.

Previous researchers reported no variation across subsamples defined on the basis of social status, and their work found that lower socioeconomic groups may have greater exposure to perceived discrimination (Kessler et al., 1999), which accounts for the interaction between SEP and discrimination in relation to depression outcomes. Our findings are also aligned with those reported by Hudson et al (2013) where, in CARDIA, racial discrimination was associated with more depressive symptoms in a black and white sample of adults 18–30 with higher SEP; however, specifically among blacks, no significant interactions were shown in their analyses (Hudson et al., 2013).

Our gender specific findings align with previous work in this area. Gender differences have been shown, and our findings are consistent- higher education is associated with better mental health for men experiencing discrimination, but directions are less variable across education for women. The absence of a significant interaction between discrimination and education among black women is consistent with the main effect findings from Schulz et al 2006, in which everyday encounters with discrimination were associated with more depressive symptoms, and were persistent and independent of socioeconomic measures of income and education. Higher education has been associated with fewer depressive symptoms among African American women (Gazmararian, James, & Lepkowski, 1995).

These data offer the opportunity to examine the interacting roles of education and perceived discrimination with depressive symptoms within a specific, but common, social context. Communities with long manufacturing industry histories are distributed throughout the United States, and often represent the most vulnerable populations with limited educational backgrounds because they were not needed to have high quality employment. The analysis included a sample of middle-aged African American adults from a North Carolina county that underwent significant industrial changes to expand the health and technological industries beyond farming and manufacturing, prior to data collection. Some communities have shifted to bring more health and technology industries to their communities to support community growth, but the impacts on the health of residents of these vulnerable communities warrants continued study. Our goal was to document these relationships after much of this shift occurred. We believe that examining longitudinal changes in these relationships requires additional work beyond the scope of this paper. As an example, the additional educational requirements to participate in health and technological industries in comparison to manufacturing industries is likely to have varied social and health effects across community subpopulations, and could influence exposure to discrimination and willingness to seek additional education (potential confounders), but stands as important future work.

The expected benefits of higher education, including improved access to preventive and treatment-based health resources, may be even more likely in communities with growing health and technology industries. Such resources could positively influence physical and mental health through health care access and increased awareness of health promoting behaviors (e.g., exercise, effective stress management and coping strategies) and should be

evaluated in future research. Our results showed that associations between discrimination and depressive symptoms were weakened for both men and women who completed high school or some college, but not those who completed college. The changing economy of the Pitt County area served to enhance the health benefits associated with higher education described above; discrimination was not associated with depressive symptoms among respondents who completed college, further supporting the health improvements attributable to higher education in communities for which education is critical (such as health and technological industries).

Limitations of these analyses include that the data are self-reported and not aligned with clinical or objectively assessed measures of education credentials or depressive symptoms. However, the use of self-reported data allows the respondent to respond to survey questions based on the most notable experiences that may contribute to mental health status, and the CES-D is recognized as a well-validated instrument across racially diverse populations. The study is also cross-sectional, which limits causal interpretation of the study findings and bi-directional relationships are possible (Hou, Kim, Wang, Shen, & Orozco-Lapray, 2015). Future analyses can address additional measures including history of job insecurity and economic hardships to address temporality. In addition, statistical power may be limited to assess this multiplicative relationship between education and discrimination within stress.

Public health implications

This sample provides a unique opportunity to explore associations between education, discrimination, and mental health within a sizable sample of middle-aged African American adults. More specifically, this sample, in which nearly 70% completed high school or less, lived in a community with a rapidly changing local economy that shifted to integrate education-intensive industries related to health and technology into a community with longstanding manufacturing and farming industries, that required less education for employment. These data provided an opportunity to retrospectively examine the impact of changing economies on the health of African American adults. Similar shifts continue to happen now in 2018, as manufacturing industries become more technologically advanced and less reliant on manual labor; older vulnerable communities dependent on these industries disproportionately suffer significant economic consequences with the exodus of such industries. Our findings highlight benefits of higher education for middle-aged African Americans living through economic industrial shifts toward health and technology. Further, increased education may have additional protective economic and health benefits that enhance their capacity to manage stressors like discrimination and to adopt preventive health behaviors that minimize the likelihood of depressive symptoms. Future work should continue to investigate the health-related changes encountered by African Americans from vulnerable communities undergoing community change to support community economic growth.

References

- American Psychiatric Association. (2017). Mental Health Disparities: African Americans. Retrieved from <https://www.psychiatry.org/File%20Library/Psychiatrists/Cultural-Competency/Mental-Health-Disparities/Mental-Health-Facts-for-African-Americans.pdf>

- Assari S, Watkins DC, & Caldwell CH (2015). Race Attribution Modifies the Association Between Daily Discrimination and Major Depressive Disorder Among Blacks: the Role of Gender and Ethnicity. *Journal of Racial and Ethnic Health Disparities*, 2(2), 200–210. [PubMed: 26863338]
- Bailey RK, Patel M, Barker NC, Ali S, & Jabeen S (2011). Major depressive disorder in the African American population. *J Natl Med Assoc*, 103(7), 548–557. doi:10.1016/s0027-9684(15)30380-1 [PubMed: 21999029]
- Borrell LN, Dallo FJ, & White K (2006). Education and diabetes in a racially and ethnically diverse population. *American Journal of Public Health*, 96(9), 1637–1642. doi:10.2105/AJPH.2005.072884 [PubMed: 16873745]
- Brody DJ, P. L., Hughes J (2018). Prevalence of depression among adults aged 20 and over: United States, 2013–2016. Retrieved from Hyattsville, MD: <https://www.cdc.gov/nchs/data/databriefs/db303.pdf>
- Curtis AB, James SA, Raghunathan TE, & Alcsér KH (1997). Job strain and blood pressure in African Americans: The Pitt County Study. *American Journal of Public Health*, 87(8), 1297–1302. [PubMed: 9279264]
- Dailey A, Kasl S, Holford T, Lewis T, & Jones B (2010). Neighborhood- and individual-level socioeconomic variation in perceptions of racial discrimination. *Ethnicity & Health*, 15, 145–163.
- English D, Lambert S, Evans M, & Zonderman A (2015). Neighborhood Racial Composition, Racial Discrimination, and Depressive Symptoms in African Americans. *American Journal of Community Psychology*, 54, 219–228.
- Federal Interagency Forum on Aging-Related Statistics. (2016). Older Americans 2016: Key Indicators of Well-Being. Retrieved from Washington, DC: <http://www.agingstats.gov>
- Finch BK, Kolody B, & Vega WA (2000). Perceived discrimination and depression among Mexican-origin adults in California. *Journal of Health and Social Behavior*, 295–313. [PubMed: 11011506]
- Fowler-Brown A, Bennett G, Goodman M, Wee C, Corbie-Smith G, & James S (2009). Psychosocial stress and 13 year body mass index change in Blacks: the Pitt County Study. *Obesity*, 17(11), 2106–2109. [PubMed: 19407807]
- Gazmararian JA, James SA, & Lepkowski JM (1995). Depression in black and white women: The role of marriage and socioeconomic status. *Annals of Epidemiology*, 5(6), 455–463. [PubMed: 8680608]
- Greenberg PE, Fournier AA, Sisitsky T, Pike CT, & Kessler RC (2015). The economic burden of adults with major depressive disorder in the United States (2005 and 2010). *J Clin Psychiatry*, 76(2), 155–162. doi:10.4088/JCP.14m09298 [PubMed: 25742202]
- Hahn RA, & Truman BI (2015). Education improves public health and promotes health equity. *International Journal of Health Services*, 45(4), 657–678. doi: 10.1177/0020731415585986 [PubMed: 25995305]
- Hou Y, Kim SY, Wang Y, Shen Y, & Orozco-Lapray D (2015). Longitudinal Reciprocal Relationships Between Discrimination and Ethnic Affect or Depressive Symptoms Among Chinese American Adolescents. *Journal of Youth and Adolescence*, 44(11), 2110–2121. [PubMed: 25963446]
- Hudson D, Puterman E, Bibbins-Domingo K, Matthews KA, & Adler NE (2013). Race, life course socioeconomic position, racial discrimination, depressive symptoms and self-rated health. *Soc Sci Med*, 97, 7–14. [PubMed: 24161083]
- James S, VanHoewyk J, Belli R, Strogatz D, & Williams D (2006). Life-course socioeconomic position and risk for hypertension in African American men: the Pitt County Study. *American Journal of Public Health*, 96, 812–817. [PubMed: 16571689]
- James SA, Jamjoum L, Raghunathan TE, Strogatz DS, Furth ED, & Khazanie PG (1998). Physical activity and NIDDM in African-Americans. The Pitt County Study. *Diabetes Care*, 21(4), 555–562. [PubMed: 9571342]
- Keith VM, Lincoln KD, Taylor RJ, & Jackson JS (2010). Discriminatory Experiences and Depressive Symptoms among African American Women: Do Skin Tone and Mastery Matter? *Sex Roles*, 62(1–2), 48–59. [PubMed: 21151821]
- Kessler RC, Mickelson K, & Williams D (1999). The prevalence, distribution, and mental health correlates of perceived discrimination in the United States. *Journal of Health and Social Behavior*, 208–230. [PubMed: 10513145]

- National Institute of Mental Health. (2019). Prevalence of Major Depression Episode Among Adults. Retrieved from <https://www.nimh.nih.gov/health/statistics/major-depression.shtml>
- Noh S, & Kaspar V (2003). Perceived discrimination and depression: Moderating effects of coping, acculturation, and ethnic support. *American Journal of Public Health*, 93(2), 232–238. [PubMed: 12554575]
- Ross CE, & Mirowsky J (2006). Sex differences in the effect of education on depression: resource multiplication or resource substitution? *Soc Sci Med*, 63(5), 1400–1413. doi:10.1016/j.socscimed.2006.03.013 [PubMed: 16644077]
- Schulz A, Gravlee CC, Williams D, Israel B, Mentz G, & Rowe Z (2006). Discrimination, Symptoms of Depression, and Self-Rated Health Among African American Women in Detroit: Results From a Longitudinal Analysis. *American Journal of Public Health*, 96(7), 1265–1270. [PubMed: 16735638]
- Shin C, Soltero E, Mama S, Sunseri C, & Lee R (2017). Association of Discrimination and Stress With Cardiometabolic Risk Factors in Ethnic Minority Women. *Clinical Nursing Research*, 26(6), 694–712. [PubMed: 27625035]
- Substance Abuse and Mental Health Services Administration. (2015). Racial/Ethnic Differences in Mental Health Service Use among Adults. Retrieved from Rockville, MD: <http://www.samhsa.gov/data/>
- Substance Abuse and Mental Health Services Administration. (2018). Key substance use and mental health indicators in the United States: Results from the 2017 National Survey on Drug Use and Health. Retrieved from Rockville, MD: <https://www.samhsa.gov/data/>
- U.S. Department of Health and Human Services. (2017, 9/15/2017). Mental Health and African Americans. Retrieved from <https://minorityhealth.hhs.gov/omh/browse.aspx?lvl=4&lvlid=24>
- Weinberger AH, Gbedemah M, Martinez AM, Nash D, Galea S, & Goodwin RD (2018). Trends in depression prevalence in the USA from 2005 to 2015: widening disparities in vulnerable groups. *Psychol Med*, 48(8), 1308–1315. doi:10.1017/s0033291717002781 [PubMed: 29021005]
- Williams DR, Gonzalez HM, Neighbors H, Nesse R, Abelson JM, Sweetman J, & Jackson JS (2007). Prevalence and distribution of major depressive disorder in African Americans, Caribbean blacks, and non-Hispanic whites: results from the National Survey of American Life. *Arch Gen Psychiatry*, 64(3), 305–315. doi:10.1001/archpsyc.64.3.305 [PubMed: 17339519]
- Zajacova A, Rogers R, & Johnson-Lawrence V (2012). Glitch in the gradient: additional education does not uniformly equal better health. *Social Science and Medicine*, 75(11), 2007–2012. [PubMed: 22920276]

Table 1.

Pitt County Study Sample Characteristics (n=1154) in 1988.

	Men (n=409)	Women (n=745)	
	N (%) or M(SD)	N (%) or M(SD)	p
CES-D Score (M, SD)	16.81 (5.23)	17.83 (5.17)	0.762
Discrimination Score (M, SD)	1.13 (0.90)	0.95 (0.77)	0.002
Education (N, %)			
Less than HS	130 (31.78%)	226 (30.34%)	0.26
Completed HS	158 (38.63%)	302 (40.54%)	
Some College	35 (8.56%)	85 (11.41%)	
College Degree or More	86 (21.03%)	132 (17.72%)	
Age (M, SD)	36.15 (6.96)	36.18 (7.25)	0.355
Married (N, %)	252 (61.61%)	305 (40.94%)	<0.01
Stress Sum Score (M, SD)	15.58 (4.15)	17.22 (4.76)	<0.01
Very Physically Active (N, %)	238 (58.19%)	270 (36.24%)	<0.01
Smoker (N, %)	179 (43.77%)	251 (33.69%)	<0.01

P values reflect statistical significance for gender differences based on two-sample t-tests for continuous measures and chi-square test results for categorical measures.

M=Mean; SD=Standard deviation

Table 2:

Linear regression models of CES-D scores within the 2001 Pitt County Study participants (n=1154)

	Model 1		Model 2	
	b	95% CI	b	95% CI
Intercept	13.37	(11.84, 14.90)	13.2	(11.61, 14.79)
Discrimination	1.84	(1.51, 2.17)	2.05	(1.51, 2.58)
Completed less than HS	Referent		Referent	
Completed HS	-2.13	(-2.78, -1.47)	-2.12	(-3.13, -1.11)
Any College	-3.38	(-4.09, -2.68)	-2.58	(-3.68, -1.47)
Discrimination*Less than HS			Referent	
Discrimination*HS			-0.03	(-0.78, 0.72)
Discrimination*Any College			-0.77	(-1.60, 0.06)
Sex	-0.29	(-0.87, 0.28)	-0.28	(-0.85, 0.30)
Age	0.07	(-0.13, 0.26)	0.06	(-0.13, 0.26)
Physical Activity	0.04	(-0.51, 0.59)	0.05	(-0.50, 0.60)
Current Smoker	0.35	(-0.21, 0.91)	0.32	(-0.24, 0.88)
Married (vs. Not Married)	-1.47	(-2.01, -0.93)	-1.50	(-2.04, -0.96)
Stress Score	0.26	(0.20, 0.32)	0.26	(0.20, 0.32)
	R ² : 24.9%		R ² : 25.2%	

Table 3:

Gender-stratified linear regression models of depressive symptoms with discrimination and educational attainment in the Pitt County Study.

	Men (n=409)		Women (n=745)	
	b	95% CI	b	95% CI
Intercept	10.83	(8.14, 13.52)	14.73	(12.79, 16.68)
Discrimination	2.44	(1.68, 3.19)	1.63	(0.83, 2.42)
Completed Less Than HS	Referent		Referent	
Completed HS/GED	-1.24	(-2.90, 0.42)	-2.89	(-4.19, -1.59)
Any College	-1.38	(-3.19, 0.43)	-3.66	(-5.08, -2.23)
Discrimination*Less Than HS	Referent		Referent	
Discrimination*HS/GED	-0.45	(-1.59, 0.70)	0.41	(-0.63, 1.46)
Discrimination*Any College	-1.33	(-2.56, -0.09)	-0.19	(-1.36, 0.98)
Age	0.12	(-0.20, 0.44)	0.01	(-0.23, 0.26)
Physical Activity	0.45	(-0.44, 1.34)	-0.30	(-1.00, 0.40)
Current Smoker	0.53	(-0.45, 1.42)	0.21	(-0.52, 0.94)
Married (vs. Not Married)	-1.05	(-1.95, -0.15)	-1.77	(-2.45, -1.09)
Stress Score	0.29	(0.19, 0.40)	0.24	(0.16, 0.31)
	R ² : 27.3%		R ² : 24.4%	

Table 4:

Linear regression models of depressive symptoms and discrimination by educational attainment among men (n=409) in the Pitt County Study.

	<HS (n=130)		HS/GED (n=158)		Any College (n=121)	
Intercept	14.28	(10.26, 18.30)	7.43	(3.57, 11.30)	5.27	(-0.39, 10.93)
Discrimination	2.64	(1.82, 3.46)	1.93	(1.07, 2.79)	1.19	(0.22, 2.17)
Age	-0.06	(-0.57, 0.44)	0.14	(-0.41, 0.68)	0.74	(0.06, 1.43)
Physical Activity	-0.67	(-2.33, 0.99)	1.35	(0.01, 2.69)	0.42	(-1.27, 2.10)
Current Smoker	0.48	(-1.12, 2.09)	0.46	(-0.88, 1.80)	0.64	(-1.03, 2.31)
Married (vs. Not)	-0.53	(-2.17, 1.10)	-0.89	(-2.27, 0.50)	-1.62	(-3.31, 0.07)
Stress Score	0.13	(-0.05, 0.31)	0.39	(0.23, 0.56)	0.44	(0.21, 0.67)
	R ² : 0.30		R ² : 0.27		R ² : 0.19	

Table 5:

Linear regression models of depressive symptoms and discrimination by educational attainment among women (n=745) in the Pitt County Study.

	<HS (n=226)		HS/GED (n=302)		Any College (n=217)	
Intercept	16.12	(13.00, 19.24)	11.49	(8.81, 14.17)	9.85	(6.71, 12.99)
Discrimination	1.76	(0.96, 2.56)	2.11	(1.39, 2.82)	1.21	(0.31, 2.11)
Age	-0.03	(-0.45, 0.40)	0.23	(-0.16, 0.62)	-0.30	(-0.77, 0.17)
Physical Activity	-0.32	(-1.56, 0.92)	-0.49	(-1.61, 0.62)	0.06	(-1.27, 1.39)
Current Smoker	-0.08	(-1.44, 1.27)	0.16	(-0.97, 1.28)	0.64	(-0.71, 1.99)
Married (vs. Not)	-2.09	(-3.37, -0.80)	-1.77	(-2.84, -0.70)	-1.16	(-2.39, 0.08)
Stress Score	0.17	(0.05, 0.30)	0.22	(0.10, 0.34)	0.35	(0.31, 2.11)
	R ² : 0.16		R ² : 0.19		R ² : 0.20	