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Effects of Minority Status and Perceived Discrimination on Mental Health

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Abstract

Based in a minority social stress perspective, this study uses propensity score matching techniques to assess the impact of self-reported discrimination on mental health. Using a sample of 14,609 young adults from the National Longitudinal Study of Adolescent Health, we explore whether the effects of discrimination vary across sociodemographic characteristics (e.g. gender, race/ethnicity, sexual orientation, body mass), including both majority and minority populations. Further we investigate the heterogeneous effects of discrimination across propensity scores, or probabilities of experiencing discrimination. We find that self-reported discrimination increases the average perceived stress score and depressive symptoms score by roughly $\frac{1}{2}$ standard deviation, but is not related to anxiety. Further, our results show that while all groups are negatively affected by discrimination, the magnitude of the impact is largest among groups with the lowest propensity scores.

INTRODUCTION

Group- and individual-level stressors work within a larger context of social disadvantage to shape mental health disparities among members of low-status, minority groups. Minority stress theory (Meyer 1995, 2003) highlights the ways that stigma operates at the structural, interpersonal, and individual levels to increase exposure to discriminatory interactions among minority persons, consequently increasing the likelihood that they will experience mental health issues. A substantial body of literature has documented the ways in which negative mental health outcomes are unevenly distributed across the U.S. population, with minority groups (e.g., non-white, female, obese, and non-heterosexual people) bearing a disproportionate burden amount of social stressors and discrimination that increase their risk of compromised mental health (Brown *et al.* 2000; Kessler *et al.* 1999; Krieger 1999; Meyer 1995; Pascoe and Richman 2009). Other work, however, has suggested that minority groups may develop protective strategies to minimize the negative consequences of discrimination

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on mental health (Crocker and Major 1989; Mossakowski 2003; Thoits 2010). As a whole, this work implies that the impact of perceived discrimination on mental health may vary across subpopulations.

This study adds to existing research on perceived discrimination and mental health by employing propensity score matching techniques and analyzing a nationally representative data set of 14,609 young adults from the National Longitudinal Study of Adolescent Health (Add Health) to assess the likelihood of experiencing day-to-day perceived discrimination by race/ethnicity, gender, sexual orientation, and body mass categories. We examine the relationship between perceived discrimination and three mental health outcomes—perceived stress, depressive symptoms and anxiety—among each of these groups. We also explicitly consider how the likelihood of people in a category experiencing discrimination moderates the effect of discrimination on mental health. That is, we test whether the impact of discrimination on mental health varies between those who are most likely and those who are least likely to experience discrimination.

We offer two primary extensions to the existing literature. First, we specifically examine discrimination during young adulthood (ages 24–34). Young adulthood is a developmental period during which individuals begin to experience heightened day-to-day perceived discrimination due to expanding social networks and increased integration into adult society (Greene *et al.* 2006). During this time period, individuals solidify their respective social positions and gain insights into both peer and normative societal judgments. Perceived discrimination, particularly during key identity-forming stages, may heighten relative concerns that one is generally not included within the “in-group” and does not have as valued a status as those in the majority (Crocker *et al.* 1998). These feelings and experiences of devaluation may serve as risk factors inhibiting healthy adult development. Thus, perceived discrimination during these formative adult years may lead to negative self-evaluations, with future implications for compromised social development or well-being (Fisher *et al.* 2000). Moreover, young adulthood is an important time to develop effective coping techniques or buffering responses that have been shown to effectively moderate the relationship between discrimination and mental health (Noh and Kaspar 2003).

Second, we advance previous literature by using propensity score matching to overcome the challenges of testing the effects of perceived discrimination on mental health. Previous estimates of the impact of discrimination on health have frequently been statistically biased and potentially underestimated because of either confounding factors or varying exposure-outcomes by status groups (Krieger 2012). Attempting to establish direct links between an event and an outcome using observational data is always complicated by the fact that respondents cannot be randomly assigned to treatment or control groups. This is particularly problematic when the treatment in question (i.e., experience of perceived day-to-day discrimination) is plagued with several sources of selection and bias. Propensity score analyses provide a useful methodological approach to combat some of this selection bias by comparing sets of individuals who have similar probabilities of experiencing discrimination—but in which one set actually reports discrimination and the other does not—to reduce differences between the comparison groups. In doing so, the approach mimics a pseudo-randomized experimental trial (Rosenbaum and Rubin 1983, 1984).

Discrimination is not randomly distributed across the population (Altonji and Pierret 2011; Carr and Friedman 2005; Mays and Cochran 2001; Puhl and Brownell 2001), and individuals who are more likely to perceive discrimination may also have previous exposure to earlier mental illness or traumatic experiences or fewer socioeconomic status (SES)-related resources, resources that are also independently related to mental health (Zimmerman and Katon 2005). Further, theories of intersectionality have articulated the importance of considering multiple overlapping minority identities in studies of health disparities (Bowleg 2012; Hankivsky 2012a). Gender, race, sexual orientation, and other sociodemographic characteristics are unique axes along which different sets of privilege and disadvantage are unevenly distributed. Individuals with multiple marginalized statuses (e.g., women and race/ethnic minorities) occupy unique social positions within a society, and disentangling the effects of any one of these statuses is difficult. To better meet these challenges, we are able to “match” or measure the effect of perceived discrimination across groups with broadly similar sociodemographic and socioeconomic positions, and psychological experiences (i.e., previous depressive symptoms and physical assault). We estimate the effects of discrimination on mental health by comparing individuals with similar likelihoods of reporting discrimination.

BACKGROUND

Discrimination is the behavioral manifestation of bias against a particular group by individuals or institutions (Fiske 2002) and is an important, albeit often overlooked, contributor to health disparities (Williams *et al.* 2003). Link and Phelan (2001) argue that key shared characteristics within minority groups frequently include experiences of perceived discrimination, which serves as a unique and independent risk factor for mental illness beyond social disadvantage explanations (Brown *et al.* 2000; Hatzenbuehler *et al.* 2013; Taylor and Turner 2002). Day-to-day discrimination may be more reflective of the chronic and pernicious effects of occupying a minority status in U.S. society, and some work has shown that perceived everyday discrimination is linked to mental illness while major acute discriminatory events are not (Lee and Turney 2012). Further, day-to-day discrimination may have long-term effects on individuals as the body becomes less responsive to such reactions, blunting the stress response over time (Steptoe, Brydon, Kunz-Ezbrecht 2005), which may result in serious long-term negative physical health outcomes (Sapolsky 2004; Marmot 2004). We present three primary aims in understanding the link between perceived day-to-day discrimination among minority-status groups and mental illness during young adulthood.

First, we aim to explore how the likelihood of reporting perceived day-to-day discrimination varies by race/ethnicity, gender, obesity, and sexual minority statuses. A large body of work has shown that race/ethnic minorities are systematically discriminated against (Altonji and Blank 1999; Bertrand and Mullainathan 2004; Phelps 1972), with a long history of race-based interpersonal discrimination and violence in the United States (Craig 2002; Williams and Mohammed 2009; Williams *et al.* 2003). Studies have also repeatedly demonstrated elevated rates of discrimination, both interpersonal and institutional, among sexual minorities (Coker *et al.* 2010; Hatzenbuehler *et al.* 2010; Huebner *et al.* 2004; Tilcsik 2011), which have been linked to poorer mental health functioning (Burgess *et al.* 2007; Feinstein

et al. 2012; Mays and Cochran 2001). Women also frequently experience discriminatory behavior (Gardner 1995), and gender is frequently reported as a reason for discrimination among women (Kessler *et al.* 1999).

Americans consistently report prejudiced attitudes towards overweight individuals regardless of ethnicity, gender, age, time period, and SES (Puhl and Brownell 2001; Puhl and Heuer 2009; Puhl and Latner 2007). Carr and Friedman (2005) showed that obese individuals report significantly higher levels of discrimination than normal weight individuals, with nearly gradient patterns of discrimination by weight categories. Compared to normal weight individuals, those who are obese had a 40 percent higher likelihood of experiencing major discrimination and a 30 percent higher likelihood of day-to-day discrimination compared to healthy weight persons (Carr and Friedman 2005). These considerations lead to the following hypothesis:

Hypothesis 1: Minority status groups (non-white, women, non-heterosexual, obese) will be more likely to report perceived day-to-day discrimination than their majority group counterparts.

Second, we aim to understand how the association between perceived discrimination and mental health varies across status groups. Heightened levels of perceived discrimination among minority groups may be one form of minority stress that leads to mental illness. Meyer (2003:675) posits that minority stress is a form of stress unique to minority status groups. It is both structural and chronic, and is therefore inescapable for minority persons. Minority stress, in part, derives from the conflict between the relatively stable norms and values of dominant groups in society and those of minority groups. The successful negotiation of these norms and values is important for key mental health domains such as self-control, personal mastery, self-efficacy, and self-worth, especially during young adulthood. Individual perceptions of self-worth are constructed through the continuous evaluation of the self, against both the perceived evaluations of others in interpersonal situations and against dominant cultural values (Jones *et al.* 1984). Experiences of day-to-day discrimination may undermine self-worth because low-status individuals may internalize continued negative societal attitudes about their group (Meyer 1995; Ridgeway 2011), thereby translating into high levels of self-stereotyping and low levels of mastery and self-esteem. This places individuals at an increasing risk of psychological distress and mental illness (Brown *et al.* 2000: 200; Kessler *et al.* 1999; Paradis and Yin 2006; Pascoe and Richman 2009; Williams and Mohammed 2008), particularly for those with fewer resources to cope effectively (Aneshensel 1992; Pearlin 1989; Thoits 1995, 2010). Accordingly, we test:

Hypothesis 2: Perceived day-to-day discrimination will have a significant positive relationship with the mental health outcomes of perceived stress, depressive symptoms, and anxiety.

Our third aim is to understand whether differences in the likelihood of exposure to discrimination moderate the relationship between perceived discrimination and mental health. There are two potential relationships. It may be that individuals who rarely experience discrimination and are not exposed to chronic stressors are protected from the

negative psychological sequelae of perceived discriminatory interactions. Stated differently, this would suggest that those with higher likelihoods to perceive discrimination would also be those most at risk of the effects. This would indicate a double disadvantage: that those with ostensibly fewer social resources also suffer the most acutely from exposure to perceived discrimination (Aneshensel 1992; Meyer 2003; Pearlin 1989; Thoits 1995, 2010).

Alternatively, it may be that perceived discrimination has a bigger impact on negative mental health among people who are less likely to report discrimination, as they have not developed adequate skills to deal with additional stressors. Previous studies have shown that while discrimination has negative effects for all individuals, the effects may be moderated by other sociodemographic characteristics. Two studies, in particular, highlighted that non-minority groups who experienced race-based discrimination reported more negative consequences associated with that discrimination than their minority counterparts (Williams 1997; Bratter and Gorman 2011). This suggests the importance of social appraisal or developed buffering resources among those with greater exposure to perceived discrimination might mitigate the negative effects of perceived discrimination.

Crocker and Major (1989) suggest that some minority group members develop strategies that reduce the impact of stigma or discrimination on mental health. Populations who are more stigmatized or more likely to report discrimination may be exposed to near-constant structural and interpersonal discrimination, and may learn to minimize or buffer against the negative effects of perceived discrimination through efforts to resist or reject stigma (Camp *et al.* 2002; Thoits 2011). Minority group members may not internalize negative interactions but instead attribute these interactions to group-level discrimination, preventing a discriminatory interaction from being interpreted as a negative reflection on the self with the attendant negative psychological results. These considerations lead to the following competing hypotheses:

Hypothesis 3a: Groups with a *higher* propensity to report discrimination will experience a larger positive association between perceived discrimination and mental illness.

Hypothesis 3b: Groups with a *lower* propensity to report discrimination will experience a larger positive association between perceived discrimination and mental illness.

DATA AND METHODS

This study uses data from Waves I and IV of the National Longitudinal Study of Adolescent to Adult Health (Add Health). The initial Add Health sample was drawn from 80 high schools and 52 middle schools in the 1994–1995 school year (Bearman *et al.* 1997). Wave IV of the Add Health survey, collected between 2007 and 2008, located 92.5 percent of the original sample and interviewed 80.3 percent of the eligible respondents, whose ages ranged from 24 to 34. Our final sample (N=14,609) excludes 1.03% of the eligible sample due to missing information on our variables of interest, with no significant differences found between those included and those excluded due to missing information.¹ The dependent variables, perceived discrimination, and propensity score variables come from Wave IV of

the Add Health survey. We additionally control for baseline depressive symptoms measured at Wave I of the Add Health survey.²

Measures

Day-to-day perceived discrimination is measured at Wave IV using the question, “In your day-to-day life, how often do you feel you are treated with less respect or courtesy than other people?” This measure taps day-to-day behavioral discrimination, rather than one-time major discrimination such as being denied a mortgage or passed over for a job. We create a dichotomous variable that captures whether respondents reported being treated with less respect never or rarely (referent) versus sometimes or often. Persons who reported discrimination are considered the treatment group (N=3,529), while those who did not serve as the control group (N=11,080).

We focus on three dimensions of Wave IV mental health: depressive symptoms, perceived stress, and anxiety. The depressive symptoms scale is the abbreviated Center for Epidemiologic Studies Depression Scale (CES-D), has an alpha of .79, and ranges from 0 to 15 with higher scores indicating more depressive symptoms (Radloff 1977). This item derives from a series of five questions that asked respondents, “How often was each of the following things true in the past seven days: you were bothered by things that don’t usually bother you; you could not shake off the blues; you had trouble keeping your mind on what you were doing; you felt depressed; you felt sad.” Respondent answers for each question ranged from “0=never or rarely” to “3=most of the time or all of the time.”

Perceived stress (Cohen Perceived Stress Scale) aims to measure the degree of stressful life situations (Cohen *et al.* 1983). It is derived from a series of questions that asked respondents to identify in the last thirty days how often “you felt you were unable to control the important things in your life”; “you felt confident in your ability to handle your personal problems” (reverse coded); “you felt that things were going your way”(reverse coded); and “you felt that difficulties were piling up so high that you could not overcome them” Respondent answers for each question ranged from “0=never” to “4=very often.” The total scale ranges from 0 to 16 and has an alpha of .72, with higher scores indicating higher levels of perceived stress.

The anxious personality scale derives from a series of questions that ask respondents whether they “worry about things”; “are not easily bothered by things” (reverse coded); “get stressed out easily”; or “don’t worry about things that have already happened”(reverse coded). Responses for each question range from strongly disagree=1 to strongly agree=5, with a total scale range from 4 to 20 ($\alpha = .70$) and higher scores indicating higher levels of anxiety.

¹Sample sizes vary for minority-group-specific analyses, as well as for analyses that employ nearest neighbor matching strategies. N sizes for these groups are provided in the tables.

²Stress and anxiety measures were only asked in Wave IV, thus we cannot control for these at baseline.

Variables Included in the Propensity Score Equation

A series of controls is entered into the propensity equation to ensure balance between persons who report discrimination (treatment) and those who do not (control). Race/ethnicity is measured using an item that asked participants to select which category best describes their racial background at Wave I. Race/ethnicity is coded as a series of dummy variables that measures whether respondents identified as non-Hispanic white (referent); non-Hispanic black; Hispanic, Asian; or other. Age is measured at Wave IV and coded as a continuous variable that ranges from 24 to 34 years of age. Sex is measured dichotomously as female (referent) or male.

Sexual orientation, measured at Wave IV, is derived from a question where respondents were asked to “please choose the description that best fits how you think about yourself: 100% heterosexual (straight) [referent]; mostly heterosexual (straight), but somewhat attracted to people of your own sex; bisexual—that is, attracted to men and women equally; mostly homosexual (gay), but somewhat attracted to people of the opposite sex; and 100% homosexual (gay).” Because of sample size limitations, respondents who reported a bisexual or mostly heterosexual identity are collapsed into the same category, as are those who report being gay or mostly gay.³ We use sexual orientation identity as our marker of sexual minority status because of its implications as a social identity that is more likely to be externally recognized by other individuals than same-sex attraction, which may be felt by individuals without external acknowledgement, or same-sex behaviors, which are likely to occur in private contexts.

Anthropometric measures of height and weight were taken at the time of interview at Wave IV and are used to calculate body mass index (BMI) for respondents. Respondents are coded as underweight (BMI <18.5), healthy weight (BMI 18.5 and <25), overweight (BMI 25 and <30), obese class I (BMI 30 and <35), obese class II (BMI 35 and <40), or obese class III (BMI 40) (World Health Organization 2000). We collapsed the healthy, underweight, and overweight categories as a referent category, as the majority of stigma is aimed at obese individuals (Puhl and Heuer 2009).

We also include a variety of socioeconomic status indicators measured at Wave IV. Previous research has shown that SES exerts a powerful influence over the health and health behaviors of individuals in several ways, including the health behaviors of their social networks, their access to health-related information, and their ability to implement health behaviors in their daily lives (Mirowsky and Ross 1990, 2003). Thus, all models (both propensity score and generalized linear models) adjust for both education and income. Education at Wave IV is measured as a series of dummy variables that identifies whether respondents have less than a high school education; graduated from high school; have attended some college; or graduated from college or received postgraduate education (referent). Wave IV total household income is measured as a series of dummy variables that captures the total income of everyone who lives in the respondent’s household and contributes to the household budget, before taxes and deductions. Respondents are coded as

³Ancillary analyses suggest that bisexual and mostly heterosexual respondents do not statistically differ in their reports of discrimination, nor do gay and mostly gay respondents.

reporting less than \$15,000; \$15,000 and <\$30,000; \$30,000 and \$75,000; \$75,000 (referent); or missing.

Living arrangement at Wave IV, which may serve as both an indicator of socioeconomic status and social support, measures the respondent's current household arrangement and measures whether the respondent lives with parents; lives alone in his/her own house; lives with a partner, spouse, or roommate(s) in a house (referent); lives in someone else's house with a partner, spouse, or roommate(s); or missing.

We include a measure of physical assault at Wave IV, which is a source of possible spuriousness in the relationship between self-reported discrimination and mental health. Physical assault is a binary variable that measures "which of the following things happened in the last month: someone pulled a knife or gun on you; someone shot or stabbed you; someone slapped, hit, choked, or kicked you; you were beaten up?" Respondents who reported at least one of these incidents are coded as having been physically assaulted in the last twelve months, and are compared to those who have not been assaulted the last twelve months (referent). We also control for depressive symptoms reported at Wave I of the Add Health survey using the CES-D scale. Accounting for previous mental health states is important, as previous mental health may influence the likelihood of perceiving discrimination as well as future mental health.

Analytical Approach

First we present the descriptive statistics for the total and self-reported discrimination stratified sample. T-tests examine within-status group differences between participants who reported discrimination or not.

We use propensity matching to examine the links between discrimination and mental health. Conceptually, this approach capitalizes on the counterfactual framework (Rosenbaum and Rubin 1983, 1984; Rubin 1997) and allows us to examine the effect of a given "treatment" on a dependent outcome of interest by estimating a pseudo-randomized experimental trial. This approach advances traditional approaches by specifically comparing individuals who are similar in their likelihood of reporting perceived discrimination, in this case, either reporting discrimination or not reporting discrimination (i.e., the counterfactual). Thus, inferences are not drawn from comparing individuals whose experiences or probabilities of experiencing the event of perceived discrimination differ substantially, which may lead to biased results.

For example, in a randomized experiment, treatment assignment is independent as illustrated in Equation 1, where W is treatment assignment and Y^1 is being assigned to the treatment group, reported discrimination, and Y^0 is being assigned to the control group, no reported perceived discrimination:

$$W \perp Y^1, Y^0 \quad (1)$$

Unfortunately, when using survey data, the treatment is not randomly distributed across the population, but rather treatment assignment is dependent upon one or more confounding variables as illustrated by X in Equation 2:

$$W \perp (Y^1, Y^0) | X \quad (2)$$

Under the counterfactual framework, however, if X can be estimated such that each respondent has some probability of being assigned to the treatment group (Y^1) that is greater than 0 and less than 1, regardless of whether that person is treated or not, then we have a Strongly Ignorable Treatment Assignment (SITA) as shown in Equation 3 and a theoretical basis for matching observations:

$$W \perp (Y^1, Y^0) | X \text{ and } 0 < P(W = 1 | X) < 1 \quad (3)$$

Thus, if we want treatment assignment, W , to be independent of X , we must have a way of estimating the treatment assignment function X as in Equation 4:

$$W \perp X | b(X) \quad (4)$$

This is done by creating a balancing score, or propensity score, estimated from a logistic regression such that there are no systematic differences between the treatment group and control group as shown in Equation 5:

$$b(x) = \text{logit}(P(W = 1 | X)) = \log \frac{P(W = 1 | X) - 1}{1 - P(W = 1 | X)} = \alpha + \beta X \quad (5)$$

Once propensity scores are calculated to derive an Average Treatment Effect (ATE) of the treatment on the dependent variable of interest (depressive symptoms, perceived stress, anxiety) illustrated in Equation 6:

$$ATE = \sum (Y_{1j} - Y_{0j}) \quad (6)$$

where Y_1 and Y_0 are the potential outcomes in the two counterfactual situations, reporting discrimination versus not reporting discrimination. We employ two different matching techniques to test if the ATE varies depending on the specificity of the match. Nearest neighbor without replacement matches treated respondents with a respondent in the control group whose propensity score is nearest to their own. All control units are dropped that are not matched to a treated respondent. Second, we use subclassification matching, which allows for easier and more robust balancing. We use this method to calculate the ATE within propensity score block quartiles (i.e., quartiles associated with the propensity to report discrimination). We generate propensity score block quartiles, which parse the data into four

blocks with even numbers of treated respondents in each; Block 1 represents the group with the lowest propensities to report discrimination, and Block 4 represents the group with the highest propensities to report discrimination. We present and discuss the results for the subclassification approach; however, nearest neighbor results are available upon request from the authors.

Third, using subclassification matching, we examine whether the ATE is constant across propensity score blocks, or whether the ATE varies by the propensity to be treated. That is, because this matching technique creates quartiles that range from the lowest propensity to be treated (Block 1) to the highest propensity to be treated (Block 4), we are able to examine the effect of discrimination on our indicators of mental health within groups that share broadly similar probabilities of being exposed to the treatment. Tests for overdispersion were conducted; thus we use negative binomial models for our analyses of perceived stress and depressive symptoms to account for overdispersion, and Poisson regression for the analysis of anxiety. In addition to the covariates used in the analysis, respondents are also matched on population weights, and in the regression analyses the appropriate population weights are applied. All analyses are conducted using the “MatchIt” (Ho *et al.* 2007) and “Zelig” (Imai *et al.* 2009) packages in R version 2.12.0.

RESULTS

Table 1 provides descriptive results and bivariate tests between the treatment (reporting discrimination) and control (not reporting discrimination) groups. Twenty-four percent of the respondents report experiencing discrimination. The descriptive statistics in Table 1 indicate that the perceived discrimination treatment group has significantly higher levels of depressive symptoms, perceived stress, and anxiety. Respondents who report discrimination are more likely to be non-Hispanic black and Hispanic, and report a bisexual or mostly heterosexual identity compared to those who did not report discrimination. They are also more likely to be obese class 2 or 3. We do not find significant differences in reporting discrimination by gay/mostly gay or in the obese class 1 category.

Table 2 shows the logistic regression model used to estimate the propensity score for the total population.⁴ Overall, Table 2 shows that with the exception of gender, minority statuses are generally associated with increased odds of perceived discrimination. In accord with previous research, women are less likely to report discrimination than men (Borrell *et al.* 2007; Williams and Mohammed 2008). Compared to non-Hispanic whites, Non-Hispanic blacks have 1.23 times higher odds of reporting discrimination, Asians have lower relative odds of reporting discrimination, and results for Hispanics do not indicate a significant relationship. Bisexual and mostly heterosexual respondents have 1.49 times higher odds of reporting discrimination than are heterosexuals, and respondents who are obese class 2 are more likely to report discrimination than are those in the reference category of BMI >18.5 and <30. SES is also consistently related to discrimination. Appendix A presents the pre-

⁴For group-specific models, propensity score models did not include controls for their specific sociodemographic group (e.g. models restricted to black respondents did not include a control for race/ethnicity).

and post-matching means for the variables that show balance improvements in the covariates after the sample has been matched.

Table 3 provides estimates of the benchmark treatment effect, which is the raw mean difference between those who report discrimination and those who do not on the dimensions of mental health, and the ATE using subclassification matching for the overall sample and within several demographic subgroups. We also present the benchmark ATE, which is the mean difference for each dependent variable of interest between the treatment group and the control group. The benchmark treatment effect for stress in the overall sample is 1.81, with the matched samples indicating that self-reported discrimination increases the perceived stress scale score by 1.41 points or approximately ½ standard deviation. Thus, when the treatment and control groups are balanced on all covariates included in the analysis, the impact of discrimination is reduced by 22 percent ($[1.81-1.41]/[1.81]*100$). Discrimination has a similar impact on depressive symptoms. The raw difference in scores between those who report discrimination and those who do not is 1.63. The calculated average treatment effect shows that matching on propensity score reduces the impact by 22 percent, so that self-reported discrimination is associated with a 1.25 point increase in the depressive symptoms scale, roughly ½ standard deviation. Discrimination is not associated with anxiety. The average treatment effect shows that discrimination increases the anxiety scale by 1.07 points, but is not statistically significant. While balancing the treatment and control groups (i.e., adjusting for selection into experience of discrimination) reduces the ATEs, a strong relationship persists between discrimination and stress and depressive symptoms.

Table 3 also presents the ATEs of discrimination on mental health indicators within demographic subpopulations. For all demographic subgroups, the ATEs from subclassification matching show that perceived discrimination has a strong positive impact on stress and depressive symptom levels. Discrimination has the largest impact on the perceived stress scales of non-Hispanic whites (ATE=1.43) and women (ATE=1.49), however, using this approach, we are unable to determine whether these values are statistically different from those of other types of status groups. Interestingly, whites and women are less likely to report discrimination than are race/ethnic minorities and men. These results suggest that while discrimination has a negative effect for all groups, the ATEs are larger among groups that are less likely to report experiencing discrimination. For depressive symptoms, perceived discrimination has a bigger effect among minority groups: ATEs are larger for blacks than whites, females than males, non-heterosexual respondents than heterosexual, and obese respondents than non-obese. Overlapping confidence intervals, however, suggest that these differences are not statistically significant.

Table 4 presents the incident rate ratios (IRRs) for the effect of discrimination on the mental health outcomes by propensity score quartile blocks derived from the model presented in Table 2. These blocks differentiate individuals by their propensity to report perceived discrimination and range from least likely to report (Block 1 or the 25 percent of the sample with the lowest propensity score) to most likely to report (Block 4 or the 25 percent of the sample with the highest propensity score), thus allowing us to run regression analyses by subclass and examine whether the impact of discrimination varies by the propensity to report

discrimination. The results show that for each propensity block, discrimination is associated with an increase in perceived stress, depression, and anxiety.

Sensitivity analyses, not shown, reveal that the effect of discrimination varies significantly across quartiles for both depressive symptoms and stress, but that there are no significant differences by propensity quartiles for anxiety. The effect of discrimination on perceived stress is significantly smaller among respondents in the group most likely to report discrimination, Block 4 (IRR=1.20, $p<.001$), than in Block 1 (IRR=1.33, $p<.001$), the group least likely to report discrimination. This pattern holds for depressive symptoms as well: the effect of discrimination among the respondents in Block 4, the group with the highest risk of reporting discrimination (IRR=1.42, $p<.001$), is significantly smaller than the effect among respondents in Block 1, the group with the lowest risk of reporting discrimination (IRR=1.55, $p<.001$). These results suggest that the effect of discrimination on stress and depressive symptoms decreases as the likelihood of reporting discrimination increases. We do not find significant differences across blocks for anxiety, suggesting that discrimination has the same negative effect on anxiety for individuals who have a low probability versus a high probability of reporting discrimination.

DISCUSSION

Institutional and individual discrimination against low-status groups remains a salient issue in the contemporary U.S. Despite ongoing legislation aimed at ameliorating unfair treatment by gender, ethnicity, sexuality, and other status characteristics, research continues to recognize the negative effect of cumulative stressors and discrimination on the health of minority groups (Thoits 2010). We further this research by combining a propensity score matched, pseudo-randomized data set to investigate the impact of perceived day-to-day discrimination on three measures of mental health for a group of young adults. Our approach focuses on young adulthood, and our use of propensity models minimizes some of the bias frequently found in this area of research. We find that when the propensity to report discrimination is not taken into consideration (i.e., the reported benchmark treatment), the estimated impact of discrimination on mental health is upwardly biased. In other words, accounting for selection into experiencing discrimination reduces the relative impact of discrimination on mental health. Overall, we find that discrimination appears to have a robust negative relationship with multiple dimensions of mental health both for the overall population and across key status categories. Most of the minority groups indicated high levels of perceived day-to-day discrimination, yet the effects of discrimination on depressive symptoms and perceived stress were higher for those least likely to report perceived discrimination.

First, we find support for hypothesis 1, with minority status associated with higher levels of perceived day-to-day discrimination for all groups. This suggests that minority perceived discrimination may partially explain the link between minority status and mental health disparities (Schwartz and Meyer 2010). Our results show that non-Hispanic blacks, bisexual or mostly heterosexual respondents, and obese class 2 respondents are significantly more likely to report discrimination than are their majority status counterparts. But, not all minority groups indicate higher levels of day-to-day perceived discrimination. The lack of

findings for gay or mostly gay respondents, obese class 3 respondents, and women may have to do with the visibility of a stigmatized minority status, time spent in a minority status, or shifting norms regarding a minority status (Goffman 1963; Link and Phelan 2001), as well as the small sample sizes among gay and obese class 3 respondents. The lack of findings for overweight and obese class 1 respondents may be associated with increasingly normative rates of obesity in the U.S. or due to the unknown amount of time an individual has been in the obese category (Ogden et al. 2012; Sturm and Hattori 2013). Similarly, the lack of discrimination reported by Hispanic and Asian minorities may reflect a variety of factors that we are unable to test, such as a buffering model-minority bias for Asian Americans, biased measures of discrimination (Gee et al. 2009), or heterogeneous populations within racial groupings (e.g., various countries of origin and immigration status) (Pérez, Fortuna, and Alegria 2008).

We also find no significant difference between gay and heterosexual respondents' reports of discrimination, perhaps because an increase in gay and lesbian access to social resources) — resources that are not as typically available to bisexual or mostly heterosexual persons (Balsam and Mohr 2007)—may buffer against perceived discrimination by improving self-efficacy and decreasing feelings of isolation (Ramirez-Valles 2002). We find that women report significantly less discrimination than men, which conforms to past research (Borrell et al. 2007; Williams and Mohammed 2008). As they are not a numerical minority, it may be that in some contexts, including day-to-day interactions, many women do not face the distinctive challenges of tokenism (Kanter 1977). This result in this study, however, should not be taken to reflect that women do not experience discrimination or tokenism *at all*. Indeed, the retention or lack of women in certain occupational positions has found that women may face substantial discriminatory burdens that are likely not captured in the general measures included here.

Second, our results support hypothesis 2 and show that perceived discrimination negatively affects depressive symptoms and stress for both minority and majority groups, controlling for baseline depressive symptoms; self-reported day-to-day discrimination increases the average perceived stress and depressive symptoms score by $\frac{1}{2}$ standard deviation. This is consistent with a social stress perspective that suggests that discrimination should have similar effects across multiple mental health measures (Aneshensel 1992; Schwartz and Meyer 2010; Wheaton 1999).

Third, further exploration finds that while discrimination is associated with stress and depressive symptoms, it has a smaller impact on among those who were most likely to be discriminated against. That is, we find support for hypothesis 3b, indicating that individuals who are less familiar with discrimination presumably have fewer coping strategies. These results are in line with previous research that has found in at least some cases, the negative effects of reported discrimination on health are larger for majority groups than their minority counterparts (Bratter and Gorman; Williams et al). It is possible that these majority groups may not have developed effective coping or buffering strategies (e.g., disengagement or minimization) compared to minority groups who have encountered discrimination more frequently and for a longer period of time. It may be that rather than acting as a chronic stressor for people who experience it most often, discrimination could act as a “shock”

whose impact depends in part on coping or appraisal skills that may buffer it. Research has shown that minority groups develop strategies that partially buffer them from the negative effects of discrimination and that repeated exposure to mild or moderate stress may actually increase the ability to manage future stressful experiences (Crocker and Major 1989; Lyons *et al.* 2009). Although we are unable to measure the strength of group-level attachment, it is also possible that members of minority groups may derive self-worth from strong social identities in ways that buffer against the immediate negative effects of discrimination. These strong group identities may also shape subjective reactions to discriminatory stressors, as the ability to appraise and cope with stressors may be more important than the frequency of the perceived stressor for mental health outcomes (Lazarus and Folkman 1984).

It may also be that these results are due to the age of the respondents in our sample and reflect early life experiences of perceived day-to-day discrimination outside of peer groups. It is possible that the link between discrimination and mental health declines with age. In general, older adults appear less likely to react to negative stressors (Almeida and Horn 2005), and some individuals may experience less discrimination as they age because of increased authority and status within the workplace, regardless of minority status (Mroczek 2004), although these gains in authority may continue to be disproportionately attributed to majority group members, influencing health disparities (Everett, Rehkopf, Rogers 2012; Karas-Montez *et al.* 2011; Podravska *et al.* 2013, Pudrovska and Karreker 2014). Further, if perceived discrimination serves as an acute stressor in young adulthood that persists throughout the life course, it may result in the blunting of stress responses, thus reducing the effect of discriminatory events on mental health, but increasing the baseline levels of depressive symptoms, anxiety, and stress. Future research would benefit from specific analysis aimed at understanding the factors such as age or minority identity that moderate the impacts of discrimination (e.g. Mossakowski 2003; Yip *et al.* 2008).

Measuring the effects of long-term chronic discrimination requires a follow-up period between the reported discrimination and the measurement of well-being. While the impact of discrimination on mental health appears similar across groups during young adulthood, the accumulation of perceived discrimination may have different implications for health outcomes by minority group status, especially over time (Geronimus *et al.* 2006; Kessler *et al.* 1999). To be sure, passive responses to discrimination may be effective for offsetting immediate psychological insults, but discrimination may have long-lasting impacts on physical health outcomes that are not apparent here (Alley *et al.* 2006; Cochran *et al.* 2001; Krieger 1999; Meyer 2003; Pascoe and Richman 2009; Wong *et al.* 2003).

There are several other limitations worth noting. We are unable to fully address the social psychological meaning of discrimination and minority status due to a limited, single measure of perceived day-to-day discrimination. For instance, we find few significant differences between gay and heterosexual respondents' reports of discrimination, despite other findings to the contrary (Mays and Cochran 2001; McLaughlin *et al.* 2010), which may be due to imprecise measurement or small sample sizes. This single measure of perceived discrimination is also unable to differentiate between informal and institutional discrimination specific to status groups. Status group differences in reactions to discrimination may be in part explained by the fact that status categories may influence the

types of symptoms expressed (Horwitz *et al.* 1996). Further, the propensity to report perceived discrimination may reflect differing response styles and interpretations of discrimination that should be probed in more detail.

Because of our specific interests in general day-to-day discrimination, our preferred measure of discrimination does not include an attributional feature (i.e., discrimination due to race/ethnicity, sexual orientation, gender, or other sociodemographic characteristic). While Add Health provides a follow-up question that asks participants the “primary” reason for the discrimination, participants are only able to choose one option. Thus, any individual who occupies more than one minority status position (e.g., a gay or bisexual person of color, an obese woman) would only be able to choose one factor that may have contributed to their experience of discrimination and would thereby severely bias inferences made from these attributions. Given the known interactive effects of multiple marginalized statuses documented elsewhere (Bowleg 2012; Grollman 2014; Hankivsky 2012b), it is likely that even with a propensity model approach isolating the independent effects of any one sociodemographic characteristic may underestimate the negative effects of perceived discrimination on mental health.

Future studies would benefit from exploring whether reductions or increases in minority group status (via, e.g., information on the role of genetics in obesity, or gay rights legislation) heighten or dampen the within-group and between-groups effects on short-term mental health. Even the definition of minority status may fluctuate somewhat with changes in stigma related to exposures, notions of responsibility, and access to resources (DeJong 1980; Meyer *et al.* 2008) and future studies should consider the intersection of multiple status categories. Further, our results are subject to omitted variable bias: objective measures of structural discrimination not included in our analysis may contribute to both mental health outcomes and the likelihood that someone reports perceived discrimination.

In conclusion, our study finds a relationship between discrimination and mental health across a broad spectrum of minority status groups, each of which faces unique challenges and sources of discrimination. In light of our findings, including consideration of the propensity to report discrimination across multiple minority status groups may be a fruitful empirical approach. Multiple theoretical perspectives (e.g., Meyer 1995; Ridgeway 2011) suggest that low-status groups share similar experiences of stigma, discrimination, and internalization of negative societal attitudes, identifying similar pathways between discrimination and mental health even though the severity of these processes likely varies between groups. Our findings suggest that although this relationship is not the same for all minority status groups, there are enough similarities to warrant future research combining multiple groups to augment the large bodies of research that consider these minority status groups separately.

Differences in mental health outcomes do not always reflect clear-cut or consistent disparities between minority-majority status categories. Importantly, we find that while minority status is generally associated with higher levels of discrimination, it does not necessarily imply a greater propensity to report discrimination or a larger deleterious impact of the discrimination across all specific mental health disorders. More consistent are the

findings that perceptions of discrimination are linked to psychological arousal. Perceived day-to-day discrimination is a social stressor, and systematic exposure is likely to have long-lasting repercussions on mental health outcomes across all status categories. Future research and public health endeavors should seek to better understand both the experiences and the adaptation to discrimination by both minority and majority groups.

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Appendix A

Means of covariates by treatment for total and matched sample

	Treated	Total	Nearest Neighbor Control	Sub-classification
	N=3,529	N=11,080	N=3,529	N=11,080
Propensity Score (μ)	26.44	23.46	26.43	26.41
Male (%)	47.73	46.62	47.73	47.49
Female (%)	52.27	53.38	52.27	52.51
Race/Ethnicity (%)				
Non-Hispanic white	51.53	56.04	51.33	51.72
Non-Hispanic black	26.15	19.84	25.70	25.58
Hispanic	15.72	16.09	16.23	15.91
Asian	4.99	6.43	4.85	5.17
Other race	1.61	1.60	1.89	1.62
Education (%)				
Less than high school	11.10	6.64	11.16	10.18
High school graduate	17.84	15.57	17.75	17.97
Some college	36.07	33.64	36.01	36.20
College degree	34.99	44.15	35.08	35.65
Age (μ)	29.05	29.00	29.09	29.05
Sexual Orientation (%)				
Gay/Mostly Gay	2.31	2.16	2.09	2.28
Bisexual/Mostly heterosexual	14.45	10.11	14.68	14.04
Exclusively heterosexual	82.31	87.04	82.41	82.74
Other	0.93	0.69	0.82	0.94
BMI (%)				
< 18.5	1.44	1.33	1.32	1.40
18.5 & <25	30.57	31.16	30.64	30.32
25 & < 30	27.19	30.47	29.13	27.64
30 & < 35, Obese class 1	18.32	18.15	17.41	18.28
> 35 & < 40, Obese class 2	10.45	8.99	9.55	10.36
40, Obese class 3	10.17	8.45	10.12	10.22

	Treated	Total	Nearest Neighbor Control	Sub-classification
	N=3,529	N=11,080	N=3,529	N=11,080
Missing	1.86	1.45	1.83	1.78
Income (%)				
< \$15,000	11.95	6.35	11.89	10.70
\$15,000 and < \$30,000	14.51	11.46	14.51	14.91
> \$30,000 and < \$75,000	42.38	44.82	41.00	42.52
\$75,000	22.88	31.48	23.84	23.54
Missing	8.28	5.89	8.76	8.33
Living Arrangement (%)				
Live with partner/spouse/roommate(s)	61.28	72.66	60.89	61.88
Live with parent	18.26	15.44	18.77	18.25
Live alone in own house	11.27	10.78	11.10	11.28
Live in someone else's house	8.49	0.52	8.62	7.92
Missing/Unknown	0.70	0.60	0.62	0.67
Depressive symptoms, Wave I (μ)	13.13	10.68	13.09	12.82
No Physical Assault (%)	74.22	79.98	73.74	74.71
Physically Assaulted (%)	25.78	20.02	26.26	25.29

Source: National Longitudinal Study of Adolescent Health

Table 1

Descriptive Statistics for the total population and by exposure to treatment

	Total N=14609	Treatment N=3,529	Control N=11,080
Self-reported discrimination (%)	24.37		
No self-reported discrimination (%)	75.63		
Female (%)	50.94	50.83	50.97
Male (%)	49.06	49.17	49.03
Race/Ethnicity (%)			
Non-Hispanic white	68.47	63.65	70.12
Non-Hispanic black	14.84	18.29	*** 13.72
Hispanic	11.66	13.67	* 11.01
Asian	3.50	2.93	† 3.59
Other race	1.53	1.46	1.56
Education (%)			
Less than high school	8.32	12.21	*** 7.07
High school graduate	17.06	18.28	16.66
Some college	33.69	35.05	32.83
College Degree	40.93	34.46	*** 43.44
Age (μ)	28.76	28.84	28.74
Sexual Orientation (%)			
100% Heterosexual	86.10	82.96	*** 87.13
Gay/Mostly Gay	2.02	1.68	2.12
Bisexual/Mostly heterosexual	11.04	14.05	*** 10.07
Other	0.84	1.31	0.68
Living Arrangement (%)			
Live with partner/spouse/roommate(s)	72.19	68.00	*** 73.55
Live with parent	15.52	18.47	*** 14.57
Live alone in own house	10.75	10.97	10.67
Live in someone else's house	0.94	1.73	*** 0.69
Missing/Unknown	0.60	0.83	0.52
BMI (%)			
< 18.5	1.46	1.51	1.44
18.5 & <25	31.76	31.94	31.70
25 & < 30	28.71	25.18	*** 29.85
30 & < 35, Obese class 1	18.50	18.22	18.59
> 35 & < 40, Obese class 2	9.51	11.56	** 8.85
40, Obese class 3	8.86	10.21	* 8.43
Missing	1.28	1.51	1.21
Income (%)			
< \$15,000	8.05	11.61	*** 6.90
\$15,000 and < \$30,000	12.47	15.75	*** 11.42

	Total	Treatment		Control
	N=14609	N=3,529		N=11,080
\$30,000 and < \$75,000	44.27	41.21	**	45.25
\$75,000	28.35	21.33	***	30.61
Missing	6.86	10.10	***	5.82
Depressive symptoms, Wave I (μ)	10.95	12.76	***	10.36
Physically Assaulted (%)	20.88	24.94	***	19.57
No Physical Assault (%)	89.05	75.06	***	80.43
Dependent Variables (μ)				
Perceived Stress	4.79	6.17	***	4.35
Depression	2.60	3.81	***	2.02
Anxiety	12.37	13.29	***	12.07

Source: National Longitudinal Study of Adolescent Health

[†]
p < .10.

*
p < .05

**
p < .01

p < .001

Note: Standard deviation for Personal Control=2.95; Standard Deviation for Depressive Symptoms=2.54; Standard Deviation for Anxiety=2.94

Table 2

Odds ratios for covariates for reporting discrimination

	OR	
Female (male)	0.84	***
Race/Ethnicity (non-Hispanic white)		
Non-Hispanic black	1.23	***
Hispanic	0.95	
Asian	0.82	*
Other race	0.96	
Education (college degree)		
Less than high school	1.40	***
High school graduate	1.12	+
Some college	1.20	***
Age	1.01	
Sexual Orientation (100% heterosexual)		
Gay/Mostly Gay	1.04	
Bisexual/Mostly heterosexual	1.49	***
Other	0.86	
BMI (18.5 and <30)		
< 18.5	1.06	
30 & < 35, Obese class 1	1.04	
> 35 & < 40, Obese class 2	1.15	*
40, Obese class 3	1.12	
Missing	1.35	†
Income (\$75,000)		
< \$15,000	1.82	***
\$15,000 and < \$30,000	1.40	***
\$30,000 and < \$75,000	1.18	***
Missing	1.18	***
Living Arrangement (Own house w/ others)		
Lives with parent	1.15	*
Lives alone in own house	1.09	
Lives in someone else's house	1.22	†
Missing/Unknown	1.18	†
Physically Assaulted (No physical assault)	1.23	***
Depressive Symptoms, Wave I	1.04	***

Source: National Longitudinal Study of Adolescent Health

† p < .10.

* p < .05

** p < .01

p < .001

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Table 3

Average treatment effects (ATEs) for discrimination on mental health

	Benchmark Treatment	Subclassification
Total Population		
Perceived Stress	1.81	1.41 (1.32, 1.51)
Depression	1.63	1.25 (1.17, 1.32)
Anxiety	1.22	1.07 (0.96, 1.18)
Non-Hispanic Whites		
Perceived Stress	1.93	1.43 (1.31, 1.58)
Depression	1.63	1.22 (1.11, 1.32)
Anxiety	1.35	1.11 (0.96, 1.28)
Non-Hispanic Black		
Perceived Stress	1.70	1.39 (1.21, 1.57)
Depression	1.62	1.31 (1.14, 1.46)
Anxiety	1.23	1.07 (0.85, 1.26)
Hispanic		
Perceived Stress	1.58	1.28 (1.09, 1.51)
Depression	1.53	1.24 (1.04, 1.42)
Anxiety	0.85	0.77 (0.51, 1.09)
Male		
Perceived Stress	1.70	1.30 (1.18, 1.45)
Depression	1.47	1.13 (1.03, 1.25)
Anxiety	1.24	1.05 (0.91, 1.23)
Female		
Perceived Stress	1.92	1.49 (1.37, 1.64)
Depression	1.79	1.36 (1.21, 1.46)
Anxiety	1.23	1.08 (0.92, 1.23)
Heterosexual		
Perceived Stress	1.78	1.41 (1.32, 1.52)
Depression	1.58	1.25 (1.15, 1.32)
Anxiety	1.17	1.07 (0.95, 1.20)
Non-Heterosexual		
Perceived Stress	1.76	1.46 (1.25, 1.70)
Depression	1.63	1.30 (1.10, 1.52)
Anxiety	1.17	1.04 (0.77, 1.36)
Obese Class 1/2/3		
Perceived Stress	1.81	1.40 (1.27, 1.55)
Depression	1.62	1.25 (1.12, 1.38)
Anxiety	1.27	1.08 (0.91, 1.26)
Not Obese		
Perceived Stress	1.81	1.20 (1.03, 1.40)

	Benchmark Treatment	Subclassification	
Depression	1.62	1.20	(1.03, 1.38)
Anxiety	1.17	1.04	(0.90, 1.19)

Source: National Longitudinal Study of Adolescent Health

Sample Sizes for Subclassification Matching: Total Sample=14,609; Non-Hispanic white=8,044; Non-Hispanic black=3,119; Hispanic=2,331; Male=6,843; Female=7,766; Heterosexual=12,550; Non-Heterosexual=1,953; Obese=5,325; Not Obese=9,284

Table 4

Incident Rate Ratios (IRRs) for the effect of discrimination on mental health

	Perceived Stress		Depression		Anxiety	
	IRR	SE	IRR	SE	IRR	SE
Propensity Score Quartiles						
Block 1 (<25%; Low Risk for Discrimination)	1.33	(0.15)	***	1.55	(0.04)	***
Block 2 (25% to <50%)	1.35	(0.02)	***	1.60	(0.03)	***
Block 3 (50% to <75%)	1.28	(0.02)	***	1.47	(0.03)	***
Block 4 (75%; High Risk for Discrimination)	1.20	(0.02)	***	1.42	(0.03)	***

Source: National Longitudinal Study of Adolescent Health

IRR=Incident Rate Ratio; SE=Standard Error

^a p < .10.

* p < .05

** p < .01

*** p < .001