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The Erosive Effects of Racism: Reduced Self-control Mediates the Relation between Perceived Racial Discrimination and Substance Use in African American Adolescents

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Abstract

Perceived racial discrimination, self-control, anger, and either substance use or use cognitions were assessed in two studies conducted with samples of African American adolescents. The primary goal was to examine the relation between discrimination and self-control over time; a second goal was to determine if that relation mediates the link between discrimination and substance use found in previous research. Study 1, which included a latent growth curve analysis with three waves of data, indicated that experience with discrimination (from age 10 to age 18) was associated with reduced self-control, which then predicted increased substance use. Additional analyses indicated anger was also a mediator of this discrimination to use relation. Study 2, which was experimental, showed that envisioning an experience involving discrimination was associated with an increase in substance-related responses to double entendre words (e.g., “pot,” “roach”) in a word association task, especially for participants who were low in dispositional self-control. The effect was again mediated by reports of anger. Thus, the “double mediation” pattern was: discrimination → more anger and reduced self-control → increased substance use and/or substance cognitions. Results are discussed in terms of the long-term impact of discrimination on self-control and health behavior. Implications for interventions aimed at ameliorating the negative effects of discrimination and low self-control on health are also discussed.

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African Americans (Blacks) continue to lag behind European Americans (Whites) in almost all indicators of physical health status (Dressler, Oths, & Gravlee, 2005; Heisler, Rust, Patillo, & Dubois, 2004). These significant differences maintain when controlling for a variety of relevant factors, including SES (Farmer & Ferraro, 2005; Williams, 1999), health care accessibility (Shi, Starfield, Politzer, & Regan, 2002), and genetic vulnerability (Adler & Rehkopf, 2008). This health disparity has led researchers to focus more attention of late on psychosocial factors that may contribute to the inequity (Gee & Payne-Sturges, 2004; Williams & Jackson, 2005). Foremost among these psychosocial factors is perceived racial discrimination (discrimination), which has been linked consistently with physical health problems in African Americans (Pachter & Garcia Coll, 2009; Williams & Mohammed, 2009).

This discrimination → physical health relation is robust, but it is mostly indirect, being mediated by other factors. Generally speaking, these factors fall into two categories: a) physiological (stress) reactions, including elevated cortisol (Thayer & Friedman, 2004), blood pressure (Huebner & Davis, 2007; Krieger et al., 2010), and C-reactive protein (Lewis, Aiello, Leurgans, Kelly, & Barnes, 2009); and b) unhealthy behaviors, including poor diet and substance use (Terrell, Miller, Foster, & Watkins, 2006; see Mays, Cochran, & Barnes, 2007, for a review). The current paper focuses on the latter relation—between discrimination and use—and an individual difference thought to mediate this relation, self-control.

Discrimination and Substance Use

Numerous studies have documented correlations between discrimination and substance use. In most cases, these relations have been synchronous, but recently, prospective relations have been found. In the Family and Community Health Study (FACHS), self-reports by Black adolescents of early experience with discrimination (by age 10 or 11) predicted their substance use (alcohol and marijuana) 2 years later (Gibbons, Gerrard, Cleveland, Wills, & Brody, 2004), and then 3 years after that (Gibbons et al., 2007). Among the parents of these adolescents, self-reports of discrimination also predicted increases in drug use and alcohol problems (e.g., missing work, DWI arrest) over a two-year period (M age at T1 = 37 years; Gibbons, Gerrard, Cleveland et al., 2004).

A subsequent study (Gibbons et al., 2010) including both experimental and survey methods, provided evidence that the discrimination → substance use relation is mediated by externalizing reactions (anger and hostility) rather than internalizing reactions (anxiety and depression). In the FACHS survey data, perceived discrimination predicted an increase in both depression and anger for the adolescents, but only the latter was associated with an increase in self-reported substance use; similar results emerged for the parents. In addition, a subset of the adolescents participated in a subsequent lab study in which they were asked to envision a stressful experience that either did or did not involve discrimination. Those who imagined discrimination reported higher levels of anger and then more willingness to use drugs, and this discrimination → willingness relation was again mediated by the increased anger and not depression or anxiety. This “differential mediation” hypothesis (Gibbons, Stock, O’Hara, & Gerrard, in press) is consistent with earlier work suggesting that anger is associated with increases in risk-taking, in general, and with substance use, in particular (King, Iacono, & McGue, 2004; Kreuger et al., 2002). One reason for this is because substances can mute the negative affect (Aklin, Moolchan, Luckenbaugh, & Ernst, 2009; Whitbeck et al., 2001). In contrast, anxiety and depression are often associated with avoidance of risky behavior, including heavy substance use (Dickson & Macleod, 2004; Fite, Colder, & O’Connor, 2006; Maner et al., 2007).

Self-Control (SC)

Substance use

The current studies use the FACHS sample to look at the *long-term effects* of discrimination on substance use, with a focus on an additional factor thought to mediate this relation: self-control. SC (also known as effortful control) is a set of related abilities that includes focusing and shifting attention, delaying gratification, and inhibiting prepotent responses (Metcalf & Mischel, 1999; Tarter et al., 1999). The reduced ability to suppress impulse that characterizes low SC can be seen in both behavioral and emotional self-regulation (Kochanska, Philibert, & Barry, 2009; Wills, Walker, Mendoza, & Ainette, 2006). Adolescents who are low in SC report being willing to use substances at an earlier age (12 or 13; Gerrard, Gibbons, Houlihan, Stock, & Pomery, 2008; Wills, Ainette, Mendoza, Gibbons, & Brody, 2007; Wills et al., 2000). In addition, longitudinal analyses have shown early SC to be related to both initial level of use and growth in use over time (Scheier, Botvin, Griffin, & Diaz, 2000), and *changes* in SC have been related to escalation of use from early to middle adolescence (Wills & Stoolmiller, 2002). Low SC has also been linked with a reduced ability to inhibit inappropriate and/or impulsive actions and emotions, including negative affect (Carlson & Wang, 2007). Thus, adolescents who are low in SC are generally more likely to experience irritability and anger (Séguin & Zelazo, 2005; Tangney, Baumeister, & Boone, 2004). In contrast, those high in SC are less likely to respond in a hostile or angry fashion to frustration and provocation (DeWall, Baumeister, Stillman, & Gailliot, 2007; see Wilkowski & Robinson, 2008, for a review). In short, low SC is associated with use directly (i.e., impulsive reactions to “risk opportunity”), and indirectly, through its impact on negative emotionality, which also leads to increased use (Brown, Lejuez, Kahler, & Strong, 2002; Wills et al., 2006, 2007).

Development

SC originates with temperament characteristics in childhood (Brody, Dorsey, Forehand, & Armistead, 2002; Gerrard et al., 2008; Wills & Dishion, 2004), and, for some adolescents, is fairly stable by age 9 or 10 (Gottfredson & Hirschi, 1990). For many adolescents, however, SC continues to develop throughout early and middle adolescence in response to life experiences (Dahl, 2004; Hay & Forrest, 2006; Stuss, 1992). Factors affecting this development include context, such as (adverse) neighborhood conditions (Pratt, Turner, & Piquero, 2004), school environments (Fox & Calkins, 2003), and teacher support and modeling (Rothbart & Ahadi, 1994). Family factors, including family socialization (Wills, Gibbons, Gerrard, & Brody, 2000) and parenting style (Brody et al., 2002; Eisenberg et al., 2005; Novak & Clayton, 2001), can have an impact. Peer influence can also alter SC-- in either a positive manner (e.g., increases in SC prompted by pro-social peers), or a negative manner (declines in SC associated with deviant peer affiliations; Burt, Simons, & Simons, 2006). In short, although relatively stable, SC can evolve during adolescence, as a result of both positive and negative life experiences. One negative experience, suggested by previous research, is perceived racial discrimination.

Self-control and Discrimination

Perceived control

The likelihood that discrimination (or perceived discrimination) can limit Black adolescents' perceived and actual potential for success has led some to hypothesize a negative relation between discrimination and perceived control (also referred to as environmental control or mastery). In reviewing this literature, Sanders-Phillips, Settles-Reaves, Walker, and Brownlow (2009) suggested that for Black adolescents, a decline in self-efficacy is, “One of the most profound psychological effects of racial discrimination” (p. S180). Indirect

evidence in support of this claim comes from cross-sectional studies showing negative relations between perceived discrimination and environmental control or mastery among Arab Americans (Moradi & Hasan, 2004), Korean Americans (Jang, Chiriboga, Kim & Rhew, 2010), African Americans (Broman, Mavaddatt, & Hsu, 2000), and even European Americans. In a sample that was 91% White, Jang, Chiriboga, and Small (2008) found that perceived discrimination was associated with negative affect and this relation was mediated by reduced mastery. Similar effects of discrimination on *self*-control have been hypothesized (Branscombe & Ellemers, 1998; Pascoe & Smart Richman, 2009). Several reasons for this putative relation have been suggested. One is that targets of discrimination often feel they must be vigilant about the possibility of unfair treatment (and worse), and this can drain psychic and emotional energy (Mays et al., 2007). Another explanation is that discrimination leads to anger, and controlling anger can deplete SC (Tice & Bratslavsky, 2000). Until recently, however, few studies had examined the discrimination / SC relation.

Self-control

Richeson, Trawalter, and Shelton (2005) suggested that minority college students on mostly White campuses may “suffer some form of chronic [self-regulation] depletion...” (p. 349). Consistent with this belief, Inzlicht, McKay, and Aronson (2006) found a negative correlation between self-regulation and self-reports of sensitivity to race-based rejection within a small sample ($N = 38$) of Black college students. The authors suggested their results may indicate that a decline in SC mediates the negative effects of race-based stigma on behavioral outcomes. In fact, they found some evidence of this in a recent lab study. Inzlicht and Kang (2010) had a diverse group of college students (67% Asian, 8% Black; $N = 91$) write about (or not write about) an experience in which they felt discriminated against for any reason (not just ethnicity/race), and then participate in a lottery game. Those who had written about discrimination chose much riskier options in the game, which the authors interpreted as reflecting a decline in SC. Recent studies by Richeson and her colleagues, also using experimental methods, have shed additional light on the SC/discrimination relation.

Interracial interaction and SC depletion

Most of these experimental studies involved having Black and/or White college students respond to a Stroop color test after they had interacted with a student from the other race (see Richeson & Shelton, 2007, for a review). Poor performance on the Stroop is usually interpreted as evidence of a decline in self-regulatory capability. Results have consistently shown that these brief interactions do lead to worse performance on the Stroop for both Whites (Trawalter & Richeson, 2006) and Blacks (Richeson et al., 2005). Moreover, Richeson et al. (2005) found that the effect was stronger for those Black students with more negative attitudes toward Whites. Similarly, in another lab study, Bair and Steele (2010) found that overhearing racist comments from a White (but not a Black) partner led to worse performance on the Stroop test for Black students, especially if they were high in racial centrality—i.e., the extent to which race is central to one’s identity.

Discrimination and acute vs. long-term depletion

These studies provide evidence that brief interracial interactions tend to tax self-regulatory capabilities for both Blacks and Whites, and also suggest that this effect may be more pronounced when the interactions are strained. That being the case, it might be expected that the long-term effect of cumulative exposure to racial discrimination would be a decline in SC (cf. Richeson et al., 2005), and an accompanying increase in risky behavior, such as substance use. In fact, similar relations have been suggested between discrimination and other health behaviors. Pascoe and Smart Richman (in press), for example, argued that repeated exposure to discrimination depletes SC, which then results in a reduced ability to

resist unhealthy foods (cf. Twenge, Catanese, & Baumeister, 2002). To date, however, the long-term relation between discrimination and SC has not been examined.

Overview

Two studies examined the relations among discrimination, SC, anger, and substance use or use cognitions among Black adolescents. Study 1 used FACHS data in two sets of analyses. First, data from three waves were included in a latent growth curve analysis to examine the long-term relations among changes in discrimination and changes in SC during an age (10 to 18) in which SC is still developing for many adolescents (Hay & Forrest, 2006). These changes were then related to changes in substance use. Next, we examined whether anger / hostility mediates the anticipated lowered SC → use relation. Study 2 used an experimental design with a subset of the FACHS sample to determine if the relations among discrimination, SC, and use are evident in indirect (nonexplicit) measures of use cognitions (i.e., word associations).

STUDY 1: Examining Long-term Effects of Discrimination on SC and Substance Use

Part 1: Discrimination, SC, and Substance Use over Time

The latent growth curve analysis included discrimination and SC from three waves and early as well as later measures of use (W2 and W4). Growth curve analyses allow for assessment of changes over time--e.g., in attitudes, dispositions, behaviors-- as well as factors that influence those individual growth trajectories. In this case, the influencing factor was discrimination, which was related to SC, and then to behavior (substance use). For the discrimination construct, latent intercept and slope variables, indicating initial levels and change over time, were parameterized and then related to the same variables for SC. The following specific hypotheses were made:

- a. Early discrimination (intercept) is negatively associated with early SC (intercept); change in discrimination (slope) negatively predicts change in SC (slope).
- b. Early SC predicts early (W2) use, SC slope predicts change in (Δ) use from W2 to W4; both relations are negative.
- c. Early discrimination predicts early use; discrimination slope predicts Δ use through its relation with SC slope.

Method

Participants and Procedure: FACHS is a panel study of psychosocial factors affecting the mental and physical health of African American families. At W1, the sample included 889 families, 467 in Iowa and 422 in Georgia. Each family had an adolescent age 10 to 12 ($M = 10.5$; 46% male) and one primary caregiver (parent), defined as a person living in the same house who was primarily responsible for the child's care. Of the 889 families, 779 remained in the panel at W2 (retention rate = 88%); 767 (86%) remained at W3; 714 (80%) remained at W4. *Mplus* Version 3.11 (Muthén & Muthén, 1998 – 2004) with full information maximum likelihood (FIML) estimation was employed; thus, the total $N(889)$ was used in analyses.

FACHS recruited participants from the full range of SES levels in rural communities and small metropolitan and suburban areas. Families were enumerated from lists of all families in a given community with a 5th grade African American child. Recruitment sites varied on many characteristics, including racial composition and economic level. Poverty rates in the neighborhoods sampled ranged from less than 20% to more than 50% of the families. Of

those families contacted, 72% agreed to participate; those who declined most often cited the length of the interview (> 3 hours, total) as the reason (for more description of the FACHS sample and its recruitment, see Cutrona, Russell, Hessling, Brown, & Murry, 2000; Gibbons, Gerrard, VandeLune et al., 2004; Simons et al., 2002; Wills et al., 2000).

FACHS interviewers were African American; most of them lived in the communities in which the study took place. The computer-assisted personal interview (CAPI) technique was used, which included the Diagnostic Interview Schedule for Children (DISC IV; Shaffer et al., 1993). W2 occurred about 22 months after W1; W3 36 months after W2; W4 36 months after W3 (*M*ages: W2 = 12.4 years; W3 = 15.6; W4 = 18.5). The procedure and interviews were the same at W1 and W2, but several minor changes were implemented at W3; e.g., adolescents were given a keypad to enter their responses (because of sensitive questions). The adolescents received \$70 at W1 and W2, and then \$80 at W3 and W4.

Measures

Discrimination: At each wave, adolescents completed 13 items from a revised version of the Schedule of Racist Events (Landrine & Klonoff, 1996).¹ This widely-used measure describes various discriminatory events and asks respondents to indicate how often they have experienced each event in the past year; e.g., “How often has someone said something insulting to you just because you are African American?” (from 1 = *never* to 4 = *several times*; α s ranged from .86 to .90 across the four waves). The items were log-transformed, and then randomly divided into three parcels, which were used in the latent growth curve analysis.

Self-control: The SC measure (adapted from Kendall & Wilcox, 1979), also widely-used, included seven items that capture respondents’ ability to inhibit prepotent responses and control emotions (e.g., “You usually think before you act.” “You stick with what you are doing until you have finished with it.” “You can deliberately calm down when you are excited or wound up.”). Response scales were: 1 = *not at all true*, 2 = *somewhat true*, 3 = *very true*; α s ranged from .63 to .67. The scale was included at W1, W2, and W4, but, due to time constraints, not at W3.

Substance use: At W2 and W4, there were two questions each about alcohol, marijuana, and tobacco use (lifetime and in the last year; yes/no), one question about heavy alcohol use in the last year, and one question about frequency of use in the last year for each of the three substances. These 10 questions were used to form four indices, which were log-transformed and used as indicators of a latent substance use construct (α : T2 = .72, T4 = .83; all loadings > .64).

Covariates: Seven constructs that have been previously linked with adolescent use and discrimination were included as covariates. Three came from the parents: SES (*education* and *income*), *state of residence* (reports of use and discrimination were higher in Iowa), and (parents’) self-reported *substance use* (26 items assessing alcohol problems and drug use); three came from the adolescents: *age*, *gender*, and *risk-taking tendency* (six items from Eysenck & Eysenck, 1977; e.g., “You enjoy taking risks” “You would enjoy fast driving”); and one came from both: *parenting style* (*communication*, *warmth*, *discipline*, and *monitoring*), 31 items: 13 from the parents and 18 from the adolescents (Brody et al., 2001).

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¹Modifications from the original scale were minor and involved simplifying the language (for administration to adolescents); deleting items, including those assessing workplace discrimination; and replacing some of them with items about perceived discrimination in the community.

Results

Discrimination and Substance Use: Table 1 presents the *Ms*, *SDs*, and correlations for all of the primary measures. At W1, 24% of the adolescents reported more than occasional experiences with discrimination (i.e., a mean > 2.0 across the 13 items); by W4, that figure was 31%. At W1, less than 3% of the adolescents reported more than minimal use (score > 1), so W1 use was not included in any of the analyses. By W2, the percentage reporting more than minimal use had climbed to 12%; at W3, it was 31%. At W4, 69% reported some use; 25% reported some tobacco use, 66% some alcohol use, 36% some marijuana use; 41% reported use of two or three substances. These figures are generally consistent with national norms for these ages (CDC, 2009; SAMHSA, 2008). A comparison of W4 participants with those lost to attrition by W4, in terms of family SES, neighborhood characteristics (e.g., crime), sex, age, W2 use, and W2 discrimination, revealed no differences for all measures ($ps > .14$).

Latent Growth Models

Correlations: We first fit an associative latent growth model (Duncan, Duncan, & Strycker, 2006) to examine the zero-order correlations among the developmental trajectories for discrimination and SC, as well as substance use, and the W1 covariates. The associative model fit the data well: $\chi^2(121, N = 889) = 249.9$; $\chi^2 / \text{degrees of freedom (fit) ratio} = 2.07$; Tucker-Lewis Index (TLI) = .92; Comparative Fit Index (CFI) = .95; Root Mean Square Error of Approximation (RMSEA) = .035. As expected, there were many significant correlations among the growth parameters (i.e., the intercept and slope) of discrimination and SC; several are worth noting. The discrimination intercept correlated positively with W4 use ($r = .16, p < .001$) and W1 risk-taking ($r = .23, p < .001$). Discrimination slope also correlated positively with W4 use ($r = .25, p < .001$), but it correlated negatively with risk-taking ($r = -.18, p < .001$). SC intercept correlated strongly with W1 risk-taking and parenting style ($r = -.27$ and $r = .39$, both $ps < .001$). State of residence also correlated strongly with discrimination and SC intercept, W2 and W4 use, and risk-taking (all $ps < .001$; in each case higher risk—including low SC and more discrimination-- was reported in Iowa). Finally, W2 use correlated with six of the seven covariates (all but SES): more use was associated with being older, male, higher in risk-taking, living in Iowa, having a parent who uses, and having a parent who engages in less effective parenting (e.g., less warmth, less communication; all $ps < .05$).

Directional model: Paths were specified in the model according to the hypotheses (see Figure 1). Modification indices were used to identify nonspecified significant paths; there were none. The full model also fit the data well: $\chi^2(127, N = 889) = 265.8$; fit ratio = 2.09; TLI = .92; CFI = .95; RMSEA = .035. For W4 substance use, variance explained was: $R^2 = .33$. The stability of use from W2 to W4 was significant but modest ($\beta = .13, p = .01$), which is not surprising given the time lag (6 years) and the developmental period (ages 12/13 to 18/19). Regarding the primary relations between discrimination and SC: As expected, their intercepts were negatively correlated ($r = -.27, p < .001$); and the path from discrimination slope to SC slope was also negative: $\beta = -.24, z = -2.67 (p < .01)$. Thus, early discriminatory experiences were associated with low SC by age 10 or 11, and then Δ discrimination from W1 to W4 was associated with Δ SC during the same time period. SC intercept negatively predicted W2 use: $z = -2.20, p < .03$, and SC slope predicted Δ use (i.e., W4 use controlling for W2 use): $z = 3.45, p < .001$. SC intercept also predicted Δ use: $z = -3.93, p < .001$ (Scheier et al., 2000), which means that low SC at an early age

²Several other constructs were included initially as covariates (e.g., racial / ethnic identity, negative life events), but were dropped from the analysis because they were not related to SC or discrimination. Including them in the analyses made very little difference in the results.

predicted an increase in substance use 8 years later, and Δ SC predicted changes in use as well. The anticipated indirect effect was also significant: discrimination slope through SC slope to Δ use: $z = 3.47$ ($p < .001$; bias-corrected bootstrapped 95% confidence interval = 1.30, 4.84). Finally, there was a direct path from discrimination intercept to early (W2) use ($\beta = .16$, $z = 2.64$, $p < .01$).

Part 2: The Role of Anger in the Relations among Discrimination, SC, and Substance Use

Longitudinal / survey and experimental studies have indicated that the relation between discrimination and substance use is mediated by externalizing responses more than internalizing responses (i.e., anger more than depression and/or anxiety; Gibbons et al., 2010; cf. Nyborg & Curry, 2003; Terrell et al., 2006). Previous studies have also linked low SC with greater emotional lability, in general, and increases in negative affect, in particular (Tangney et al., 2004), which then led to an increase in substance use (Tarter, Blackson, Brigham, Moss, & Caprara, 1995). The second set of analyses added anger as a mediator of the discrimination to use relation. Because of the wording of the FACHS anger measure (self-reports reflecting back over the past year, which is typical), and the lack of a SC measure at W3, analyses were limited to the first two waves. The FACHS discrimination scales from W1 and W2 were combined to form a cumulative measure.³ The specific hypotheses were that: a) low SC would be associated with more anger, b) this anger would mediate the effect of SC on substance use, and c) as a result, both anger and SC would mediate the effect of cumulative discrimination on use. The same covariates from the latent growth curve analysis were used; SC and use came from W2. The *measure of anger* (W2) included four items: "How often in the last year did you.. feel grouchy... lose your temper... get angry because you felt you were treated unfairly .. get annoyed?" (from 0 = *never* to 4 = *nearly every day*; $\alpha = .74$).

SEM

Measurement model: Self-reported anger from these adolescents was low: Mean across the four items was .40 (out of 4). Use, SC, and anger were all correlated at W2 (all r s $> .15$, p s $< .001$). A confirmatory factor analysis (CFA) using FIML estimation was conducted to determine if the indicators loaded on the constructs as expected. Cumulative discrimination was specified as manifest, as were the seven covariates. There were three latent constructs: anger (indexed by the four items), SC (indexed by three random parcels of the seven items), and use (indexed by the same 10 items for the three substances, as before: alcohol, marijuana, and tobacco). The CFA with all 11 correlated constructs provided a good fit to the data: $\chi^2(105) = 206.06$; Fit ratio: 1.96; RMSEA = .033; CFI = .96; TLI = .93. All completely standardized factor loadings were $> .53$.

Structural model: The structural model also fit the data well: $\chi^2(106, N = 889) = 207.6$; fit ratio = 1.96; TLI = .93; CFI = .95; RMSEA = .033. As can be seen in Figure 2, W1/2 discrimination had a direct negative path to W2 SC ($p = .02$), and positive paths to W2 anger ($p < .001$) and W2 use ($p = .01$). Significant relations (paths) existed between W2 SC and W2 anger, and then W2 anger and W2 use (both p s $< .001$). The total effect of discrimination on W2 use was: $z = 3.72$, $p < .001$; the total indirect effect of discrimination on W2 use through SC and anger was: $z = 3.41$, $p < .001$. Finally, the following specific *indirect paths* were significant: discrimination through W2 anger to W2 use ($z = 3.44$, $p < .001$); discrimination through W2 SC to W2 anger: $z = 2.37$, $p < .02$; W2 SC through W2 anger to use ($z = -3.25$, $p < .001$), and discrimination through W2 SC and W2 anger to W2 use ($z = 2.08$, $p < .05$).

³Results looked very similar when only W1 discrimination was used in the analyses, which is further indication of the impact of early discriminatory experiences (Gibbons, Stock et al., in press).

Discussion—As expected, discrimination was related to anger, SC, and use. More specifically, the relation between discrimination and subsequent use was direct, and also mediated by the relation between discrimination and both SC and anger. The mood mediation results suggest that the erosion of SC is associated with increased susceptibility to negative emotionality (Gilliom et al., 2002); in particular, the reduced SC may leave these adolescents with less capability of monitoring and/or inhibiting their anger and hostility (DeWall et al., 2007; Tangney et al., 2004). The fact that the SC to anger relation existed controlling for the strong direct relation between discrimination and anger suggests the reduced SC is increasing reactivity to other anger producing factors besides discrimination. It is also likely that increased anger and reduced SC have a reciprocal relation; controlling one's anger can deplete SC (Tice & Bratslavsky, 2000), just as depleted SC can result in hyperemotionality. The net result is a reduction in the ability to resist the urge to use substances and an increased interest in using substances to mute the anger. Finally, these relations existed controlling for a number of potential confounders, two of which have been shown to have links to both discrimination and substance use-- SES and risk-taking. The latter is noteworthy, as it suggests the effects of discrimination on SC exist net the relation between SC and another, very similar individual difference factor (in fact, unlike with SC, early discrimination actually predicted a decline in risk-taking by W4; $p = .001$).

Study 2: Discrimination, SC, Anger, and Implicit Measures of Substance Cognitions

To date, the studies linking discrimination with substance use have included only explicit measures. Although useful in establishing relations, such measures have drawbacks when used for assessments of sensitive topics such as substance use because they can be affected by social desirability and they are subject to third variable alternative interpretations. These concerns have led an increasing number of researchers investigating risky behaviors to supplement their explicit measures with implicit or indirect measures, which are thought to be less influenced by social desirability and impression management (Houben, Wiers & Roefs, 2006; Stacy, Ames, & Grenard, 2006; Wiers & Stacy, 2006).

Recent comparisons of the most commonly-used implicit measures--word associations, the IAT, the EAST (De Houwer, 2003), and reaction times—have concluded that word associations are the best predictors of socially undesirable behaviors like substance use, both in general (Ames et al., 2007; Rooke, Hine, & Thorsteinsson, 2008; Wiers et al., 2007), and net explicit measures of use (Thush et al., 2007). Avoiding “inappropriate” responses to double entendre prompts (e.g., roach, bust, pot) requires some level of self-regulation, which is less likely when individuals are under stress, or when cognitive load is high and so working memory capacity is reduced (Grenard et al., 2008; Rooke et al., 2008), or, when SC is depleted (Gailliot & Baumeister, 2007). In other words, reduced SC due to a taxing situation, such as a discriminatory experience, should result in more expression of substance-related words that would normally be inhibited. Such a pattern would provide evidence of the cognitions linking discrimination with use and also add support for the hypothesis that discrimination reduces SC, and in particular, impulse control.

Overview

A subset of the FACHS sample was brought into the lab after the third wave of data collection to participate in an experiment that involved envisioning a discriminatory experience (or not) prior to providing associations to double entendre words. SC was included as a moderator (instead of a mediator) this time; there were two reasons for this. First, a measure of SC, even an indirect measure (e.g., a Stroop task), could interfere with the indirect measure of substance use. Because it was the primary dependent variable, the

indirect use measure needed to follow the manipulation as soon as possible. Second, it was assumed that by this age (18 or 19) the long-term effects of discrimination on SC (i.e., erosion) would be well established; i.e., lower SC reflects more experience with discrimination. Thus, it was assumed that: a) participants in the Discrimination condition would be more likely to respond with substance-related associations to the double entendre words, b) that effect would be stronger if they were also low in dispositional SC; and c) this anticipated SC $\times$ Condition (Discrimination vs. Nondiscrimination) interaction would again be mediated by self-reported anger.

Method

Participants—Letters were sent to 175 adolescents from the Iowa FACHS sample asking for participation in a lab study. Because the study concerned substance use, we (randomly) oversampled adolescents who had indicated in earlier waves of FACHS that they had used drugs or drank heavily. Of the 175, 149 agreed to participate, and 139 completed the study; however, only 116 of them had SC data, which came from W1 and W2 of FACHS. Data from two adolescents were deleted because they were > 3 SDs from the mean, leaving a total of 114 (74 females; M age = 18.5). This is the same sample and procedure (discrimination manipulation) used in Gibbons et al. (2010), but with a different outcome measure (see below).

Procedure—The study was conducted by two African American experimenters. Participants were told the study was designed to examine health relevant attitudes and behaviors, and also how African Americans respond to stressful and successful experiences. Each session began with a practice word association task that included 10 neutral words (e.g., fruit, car). Participants were told to respond out loud with the first word that came to mind and to work quickly. They responded into a microphone attached to a headset; responses were recorded. They were then randomly assigned to one of three visualization scenarios, which were presented to them on a computer screen. In each case, they were asked to take some time to imagine being in the situation and then think carefully about how they would react to it. All three scenarios were job situations. One involved racial discrimination (Discrimination), including racial insults and unfair treatment from a boss (similar manipulations were used by King, 2005; and Yoo & Lee, 2008). The second (Stress) also involved job stress, but it was unrelated to racial discrimination—i.e., falling behind at work due to a sick co-worker and equipment problems, potentially resulting in a negative evaluation from the boss. The third scenario (Control) involved a non-stressful work experience: finding an address while working as a delivery person. Afterwards, participants were asked how stressful they would find the experience. They then indicated how the experience would make them feel, by responding to a mood adjective checklist. Next came the word association; the explicit measure of drug use was the last measure. After debriefing, participants were paid \$105 for their time and travel expenses.

Measures (in the order in which they were assessed, with the exception of the covariates)

Self-control: SC came from FACHS (same as Study 1) W1 and W2, which were combined ($\alpha = .70$).

Stress: After envisioning the scenario, participants were asked, “How stressful would this be for you?” on a scale from 1 = *not at all* to 4 = *very*.

Anger: The mood adjective checklist included the items “angry” and “hostile,” which were combined to form the anger mood scale ($r = .42$, $p < .001$).

Word association: Participants were presented with a list of 25 words, one at a time. There were eight double entendre words, six with drug associations (e.g., hit, pot, roach), and two with alcohol associations (pitcher, draft). Two raters, blind to condition, coded each response in terms of its substance relation; agreement between them was high (intra-class correlation = .96). Either alcohol or drug related responses were coded as substance relevant (one point for each response); possible range = 0 – 8.

Substance use: Participants indicated how often they had used marijuana, crack, cocaine or other illegal drugs, and gotten drunk in the past 6 months (four items, from 1 = *not at all* to 4 = *a lot*).

Covariates: The covariates were: gender, parents' SES, and risk-taking (these were the same as in Study 1), plus past use and self-reported stress. Controlling for previous use and stress allowed us to isolate the effect of discrimination on word associations.

Results

Hypothesis I: Effects of Envisioned Discrimination and SC on Word Associations

Stress: An ANCOVA (with the above five covariates plus dispositional SC) performed on the stress measure revealed a main effect of Condition: $F(2,113) = 20.13, p < .001$. As expected, the mean in the Discrimination condition ($M = 3.26$) was significantly higher than that in either the Control ($M = 2.06, p < .001$) or the Stress condition ($M = 2.78, p < .05$); and the Stress condition mean was higher than the Control mean ($p = .001$). Because we were interested in the effects of discrimination (and SC), and not stress (e.g., work-related stress) on associations, all subsequent analyses controlled for this stress measure.

Comparisons across conditions: Of the 114 participants, 42% provided at least one substance related association. The correlation between the word association (implicit) measure and the explicit measure of self-reported (prior) use was comparable to that found in previous studies: $r = .28, p < .01$ (Greenwald, Poehlman, Uhlmann, & Banaji, 2009).⁴ A series of regressions was conducted (including the three controls, plus past use and self-reported stress) comparing word associations in each condition with those in the other two. Both regressions involving the Discrimination condition produced evidence of a main effect of condition: Substance associations were higher in the Discrimination condition than in each of the other two (both $ps < .03$). In contrast, a comparison of the Stress and Control conditions revealed no differences ($p = .43$). Consequently, for simplification purposes, the two nondiscrimination conditions (Control and Stress) were combined in the regression analyses and then compared with the Discrimination condition.

Regressions: The first step of the hierarchical regression, which included the controls plus SC, revealed main effects of: a) gender ($p = .03$), b) previous use ($p = .05$), and c) risk-taking ($p = .01$); SC entered significantly ($p < .02$), but dropped out when risk-taking was entered. More substance associations were provided by males, those low in SC, those high in risk-taking, and those high in previous use. When Condition and the $SC \times$ Condition interaction were entered in the next step, gender became marginal ($p < .10$), and previous use remained significant ($t = 2.41, p < .02$).⁵ Most important, Condition was significant:

⁴Substance-related word associations were also correlated with the substance use willingness measure that was reported in Gibbons et al. (2010): $r = .21, p = .02$.

⁵When stress was dropped from the list of covariates, the results were almost identical—all effects remained significant, and the patterns unchanged. Also, if risk-taking was not included, SC remained as a significant predictor when previous use and condition were entered into the equation, further evidence that lack of impulse control was related to substance word associations.

More use associations were reported by those in the Discrimination condition: $\beta = 1.47$, $t = 2.39$, $p = .02$. The $SC \times$ Condition interaction was also significant: $\beta = -1.38$; $t = 2.24$, $p < .03$; as the most substance associations came from participants in the Discrimination condition who were low in dispositional SC (see Figure 3). Finally, additional analyses were conducted including the same predictors, but with the addition of previous use as a predictor (main effect and interactions). This analysis revealed a 3-way interaction ($SC \times$ Condition $\times$ Previous Use; $t = 2.21$, $p < .03$), reflecting the fact that, with one exception, effects (main and interaction) were stronger for the users, as expected. The exception was that Condition was a significant predictor for the Nonusers (when they were analyzed separately; $p < .05$); thus, even those who were not using substances responded with more substance associations in the Discrimination condition.

Hypothesis II: Anger as a Mediator of the SC $\rightarrow$ Use Relation—Part 1 of the mood mediation analysis involved regressing anger on: the covariates, Discrimination, SC, and the $SC \times$ Discrimination interaction. SC entered marginally, with more anger reported by low SC participants ($p = .08$), but then dropped out when the $SC \times$ Condition interaction was entered. In the final step, previous use ($t = 2.54$, $p < .01$), Discrimination ($t = 2.61$, $p < .01$), and the $SC \times$ Discrimination interaction ($t = 2.76$, $p < .007$), all entered significantly and followed the same pattern as with the word associations: more anger for users, and for those in the Discrimination Condition, especially if they were low in dispositional SC.

Part 2 of the mediation analysis involved adding anger in the final step of the word associations to check on mediation. As expected, anger was related positively to substance use word associations ($t = 2.95$, $p < .004$). Also, both the Discrimination main effect and the $SC \times$ Discrimination interaction became nonsignificant when anger was added ($ps > .10$), reflecting significant mediation (Sobel: $t = 2.03$, $p < .04$; bootstrapping confidence intervals = $-.59$, $-.01$). Thus, the low SC people in the Discrimination condition reported the most anger, and this anger, in turn, was associated with the most substance-related thoughts, as evidenced by the word associations.

Discussion

The fact that users responded with more substance-related words provides some evidence of the validity of the word association task. Of more interest, the main effect of Discrimination, controlling for both previous use and SC, indicates that thinking about discrimination increased substance-related cognitions even for those who were not regular users. Moreover, the absence of a main effect for self-reported stress, and the fact that the discrimination effect maintained when self-reported stress was controlled,⁶ suggests it was not the (anticipated) stress associated with the discriminatory experience that led to the use cognitions. Instead, there appears to be something distinct about discrimination—besides the fact that it is stressful. One possibility, suggested by the first study and previous research, is that thinking about discrimination is associated with a reduction in impulse control, which then results in an increase in responses that are not socially desirable. This is especially true if the respondent happens to be low in SC, but the discrimination effect does not appear to depend on that predisposition. In other words, thinking about discrimination may elicit responses from Black adolescents that are similar to those typically found for individuals with low SC. Finally, results on the mood analyses suggest that anger is also

⁶The use reports came after the word associations; and so, although not likely, those reports could have been influenced by the word associations. Consequently, regressions were redone using a measure of self-reported use aggregated from previous waves (W1 and W2) of FACHS (the measure used in Study 1). Results did not change: The self-report of use from previous waves of FACHS was actually a stronger predictor of use associations than was the use measure from the lab session ($\beta = .41$, $t = 4.92$, $p < .001$); more important, the Condition main effect and the $SC \times$ Condition interaction remained significant.

related to both discrimination and low SC, and so is an important mediating factor in these relations.

General Discussion

There was evidence in both studies that discrimination was associated with SC and substance use. This relation could be seen across measures that were both explicit (self-reports of use) and implicit (substance-related word associations). It could also be seen in studies using experimental as well as survey methods, and across different ages, from 12 to 19 (albeit, within the same sample). Some of these relations have been identified previously; the association between discrimination and substance use, for example, has been found in both cross-sectional and prospective studies (see Gibbons, Stock et al., in press, for a review). The same is true for the relation between (low) SC and use—a relation that has been documented many times (Scheier et al., 1999; Wills et al., 2000; 2007). Similarly, a number of recent lab studies have provided indication that interracial interactions involve executive functioning (i.e., self-monitoring of behavior) on the part of both Blacks and Whites (Bair & Steele, 2010; Richeson et al., 2005), and as a result, can lead to a temporary depletion of self-regulatory resources—even though those interactions may have involved no conflict. However, although the relation has been suggested by others (e.g., Pascoe & Smart Richman, 2009), this is the first study to demonstrate an association between discrimination and dispositional SC and do so over an extended period of time. It is also the first study to link all three constructs (SC, discrimination, and use) prospectively during late adolescence—a critical developmental period in terms of both SC and substance use.

Discrimination and SC

Impulse control and use associations: In Study 2, participants in the Discrimination condition provided more substance-related responses to the double entendre words. These effects maintained controlling for previous use, and they occurred for nonusers as well as users, suggesting that they are not just a reflection of the fact that they were thinking about past behavior. Instead, these effects are consistent with a belief that discriminatory experiences, whether real or imagined (envisioned), can at least temporarily reduce impulse control—much as actual interracial interactions have been shown to deplete self-regulatory capacity in laboratory studies (Richeson & Shelton, 2007). Most of these lab studies were conducted with Black students on mostly-White college campuses. As some researchers in this area have suggested, Black students in these settings may experience some kind of “chronic depletion” due to their token status (Richeson et al., 2005). In contrast, most FACHS participants have not attended college, and they tend to live in lower-middle SES neighborhoods with significant Black populations. Nonetheless, they have experienced discrimination, and, for some of them, these experiences appear to have reduced their ability to self-regulate in a manner similar to that thought to occur among Black college students.

Discrimination and SC over time: The relation between discrimination and SC in these data is both complex and dynamic. Although Black adolescents who are low in SC are more likely to report experiencing racial discrimination early in life (i.e., by age 10 or 11), the latent growth curve analyses indicated that the cumulative effects of discrimination—specifically, the erosion of SC—exist independent of initial level of SC. So, the effect is general, and does not appear to vary much depending on the characteristics of the Black adolescent—or at least the ones we measured, including parenting, risk-taking and racial identity. The SC / discrimination relation is dynamic in the sense that cumulative discrimination appears to lower Black adolescents’ SC, which then leads them to be more reactive to future negative experiences. Evidence of this is the fact that reduced SC led to more self-reported anger (cf. Seguin & Zelazo, 2005), controlling for the strong relation that existed between discrimination and that anger. In terms of temporal ordering, we suspect

that Black adolescents' *initial* reaction to discriminatory experiences is one of anger and hostility—as was the case in the lab studies. Over time, however, these effects accumulate, as *repeated exposure* to discrimination depletes SC—because of its effects on anger, which must be controlled, and because anticipating and then actually coping with these aversive experiences is draining (Branscombe & Ellemers, 1998; Sanders-Phillips et al., 2009). As suggested earlier, we believe this anger / SC relation is (or becomes) reciprocal: Low SC → more anger (in response to events like discrimination), whereas anger and anger control → reduced SC. Discrimination affects both, and in turn, leads to more substance use.

Discrimination and Substance Use—The relations between discrimination and use were both direct and indirect, suggesting that discrimination affects substance use in two different ways. We believe the direct path from discrimination to use is indication of coping behavior. In three separate studies, Gerrard et al. (2011) found that this discrimination → use (direct) relation was significantly stronger for Black adolescents who had previously reported that they use substances to help them cope with problems. The moderation in those studies maintained controlling for reports of previous use, which further suggests the relation was, in fact, indication of use-as-coping and not just general use. In the current study, this direct effect occurred independent of the impact that discriminatory experiences had on participants' emotions (anger) or their SC. In short, actual discriminatory experiences (Study 1), or thinking about such experiences (Study 2), both appear to be associated with this use-as-coping process.

The indirect relations, through both anger and reduced SC, are potentially more important in the sense that they reflect possible long-term consequences of discriminatory experiences for substance abuse as well as use. Anger and hostility are associated acutely with both alcohol and drug use (Krueger, 1999; Krueger et al., 2002), and that includes anger associated with discrimination (Gibbons et al., 2010; Terrell et al., 2006). Cumulative effects (on use) of these externalizing reactions have not been examined as closely, but there is reason to believe that repeated expressions of hostility increase both drug and heavy alcohol use (Hampson, Tildesley, Andrews, Luyckx, & Mroczek, 2010). The same is true for reduced SC, and especially, the combination of the two—more anger *and* reduced ability to restrain that anger may lead to more risky behavior (Curry & Youngblade, 2006; Lerner & Keltner, 2001), including more use.

Early discriminatory experience: The indirect effect of early (W1/2) discrimination, through W2 anger, on early use (Study 1) was consistent with previous FACHS analyses with the adolescents (Gibbons et al., 2010). Moreover, W1 discrimination was associated with adolescents' use 8 years later ($p < .001$), through its relation with W1 SC. These results add to an increasing array of studies documenting the important and varied impact that early experiences with discrimination can have on Black adolescents (Gibbons, Stock et al., in press). Besides substance use, early reports of discrimination in FACHS have been shown to predict lower educational attainment (O'Hara, Gibbons, Weng, Gerrard, & Simons, in press), as well as increases in risky sexual behavior (Roberts et al., in press), conduct disorder (Gibbons et al., 2007), and delinquency (Simons et al., 2006), anywhere from 2 to 8 years later. In each instance, these relations emerged controlling for other individual differences (e.g., risk-taking, pessimism, negative affectivity), as well as different environmental factors (stressors; substance availability in the neighborhood) that would put these adolescents at risk. The current results suggest that reduced SC may be a common thread in many of the various discrimination / risk relations found in previous studies. In short, these early experiences are stressful, and for some Black adolescents, they appear to instigate potentially long-lasting alterations in basic self-regulatory processes that can put them at increased risk for health problems for some time to come.

SC and Stress

Environmental risk: Adolescents who are low in SC are less likely to avoid situations that present risk opportunity (Bolin, 2004; Nofziger, 2009). Once in these risky situations, they are also less likely to control their emotions (e.g., anger leading to aggression; DeWall et al., 2007). This is consistent with the pattern of responses seen in Study 2. Low SC adolescents were more likely to report that the discriminatory experience would anger them, and they were more likely to respond to the double entendre words with substance-related associations after envisioning a discriminatory experience. Risk is a constant presence for many Black adolescents; it may be physical (e.g., high crime rates in the neighborhoods in which they are being raised; Williams & Collins, 2001), emotional (depression that accompanies low SES and physical risk; Galea et al., 2007), or health-related (substance availability, high rates of STIs). The possibility that the ability to avoid and/or cope with these risk factors emanating from their own neighborhoods may be reduced by treatment they receive from those outside their immediate environment (discrimination is higher for those with more contact with Whites; Seaton & Yip, 2009) suggests an increased level of vulnerability that may contribute to the pronounced racial disparities in health status that exist in the U.S. Moreover, these results are consistent with the belief, expressed by many, that discrimination contributes significantly to these disparities (Gee, 2008; Williams & Mohammed, 2009); what the current data add is some indication of how this relation develops over time.

Change in SC: Longitudinal assessments of SC have provided evidence of its reliability across time, suggesting that for some adolescents, it is a reasonably stable disposition perhaps as early as age 10 or 11 (Arneklev, Cochran, & Gainey, 1998; cf. Gottfredson & Hirschi, 1990). Nonetheless, studies have shown that for many adolescents, SC can and does vary in certain contexts (e.g., being depleted by social interactions), and that its developmental trend during adolescence can be influenced by different social and environmental factors (Hay & Forrest, 2006). Few studies have focused on the effects of sustained stress on trajectories of SC change, but those that did have shown that long-term stressors in early childhood, such as physical or sexual abuse, or family conflict, produce dysregulated emotional and behavioral control; and this, in turn, can lead to substance use and other risky behaviors (Glaser, 2000; Repetti, Taylor, & Seeman, 2002). The current studies add another factor to this list of stressors that can alter the developmental trajectory of SC over time-- racial discrimination.

Limitations—There are several limitations in these studies that should be mentioned. First, there was no measure of SC at Wave 3. The gap between W2 and W4 was long (6 years), and we do not know what happened to the adolescents' SC during this time period. Moreover, having only three waves of SC data reduced our ability to model quadratic relations (see Duncan et al., 2006), and limited the analyses involving anger (as a mediator) to the first two waves. Although certainly not ideal, the lack of a third wave does not alter the conclusion that the intercept and slope of discrimination were related to the intercept and slope of SC (and then to use); it does, however, limit our ability to examine the nuances of change in SC over time and its relation with change in discrimination. Second, although we included a series of covariates that could potentially confound the SC / discrimination relation (e.g., risk-taking disposition, parental use), it is possible there were other constructs that we did not assess that may have contributed to the relations we found.⁷ Third, the

⁷As mentioned earlier (Footnote 2), a number of other covariates were included in the analyses but then dropped because they were not related to discrimination and SC. When the growth curve and SEM analyses were conducted without any covariates, the relations between discrimination and both SC and use became stronger, but the R^2 for use dropped significantly (from .13 to .08 in the SEM and from .33 to .27 in the growth curve), indicating that the covariates were important and explained meaningful amounts of variance in the outcome measures. Nonetheless, there could have been other important measures that we did not assess.

internal reliability of SC at W1 and W2 was low (α s = .63 to .67), even though it was fairly stable over time. Low measurement reliability is common among adolescents (Kessler, Avenevoli & Merikangas, 2001). This is a problem, of course; however, it is a problem, in part, because low reliability would tend to attenuate the relations we found (thereby working against hypotheses). More recent SC scales (e.g., Tangney et al., 2004) may provide a better measure, and so should be considered in future studies. Fourth, the measures of SC and discrimination in Study 1 were self-reports (discrimination was manipulated in Study 2). Although both measures have been shown to have good psychometric properties, like many self-reports, neither one could be considered an objective measure of the construct. It is possible, for example, that adolescents who are low in SC may have a different “threshold” for perceived discrimination (just like they have a lower threshold for provocation and anger). This would not change the results in any way, but could suggest somewhat different interpretations. Whenever possible, future studies should include reports from others as well as self-reports, especially for SC. Finally, the sample was different in several respects from those typically seen in studies of African American adolescents, including being less urban, and more rural, and also including participants from a state that is > 90% White, Iowa (but also one that has a large percentage Black population: Georgia). In some respects, this adds to our ability to generalize to the African American population at large, but it is also the case that these unique or atypical features must be considered when doing so.

Future Directions—As suggested earlier, there is reason to believe that lowered SC may be an important factor in the link, found in previous studies, between discrimination and other negative outcomes, including risky sexual behavior, less academic success, and conduct disorder. Examining this hypothesis should be a priority for future studies. Previous studies in FACHS have shown discrimination to be a stronger predictor of substance use than any one of the many additional stressors we have measured (e.g., financial, relationship, physical problems; neighborhood risk, negative life events, lack of social support). We believe this is due to the unique nature of discrimination as a stressor: it is pervasive, uncontrollable (race can’t be changed, majority attitudes are hard to modify), and at a very basic level, it is frustrating simply because it is unfair. Future studies should look at how discrimination compares with, and combines with, these other important stress factors in influencing erosion of SC. It will also be important to see if the cumulative effects of discrimination and its effects on SC and use continue into adulthood—when there is evidence of significant increases in problematic use by African Americans relative to other ethnic groups (referred to as a “racial cross-over” effect; Ensminger et al., in press; SAMHSA, 2008). Finally, there are several moderators or buffers that may affect the Discrimination / SC / health behavior relations. In addition to parenting (mentioned earlier), racial identity has been shown to buffer the effects of discrimination against risk cognitions (willingness, risk prototypes), as well as substance use (Stock, Gibbons, Walsh, & Gerrard, in press). These constructs merit future empirical attention.

SC as a muscle: Baumeister and his colleagues have likened SC to a muscle, suggesting that various factors (e.g., stressors) can deplete self-regulatory capacity on a short-term basis, but then, with some rest (i.e., reduced stress), that capacity is replenished (Baumeister, Vohs, & Tice, 2007). Moreover, repeated cycles of depletion and restoration (rest) are thought to actually strengthen the “muscle” over time (Muraven & Baumeister, 2000). There was no evidence of “replenishment” in this sample. Although we do not know for sure, we suspect one reason for this may be that for many Blacks in the U.S., there is no “rest” from discrimination, nor is there reason to suspect that the situation will improve any time soon (Branscombe & Ellemers, 1998). Determining whether discrimination may actually promote a strengthening of SC for some people, and/or under some circumstances, is also worthy of future attention.

Gene × Environment interactions?: Analyses of genetic data have indicated that the relation between discrimination and conduct disorder found in previous studies (e.g., Gibbons et al., 2007) is significantly stronger for males with a short allele of the serotonin transporter gene, 5HTTLPR (Brody et al., 2011). Recent analyses with FACHS data have also shown that individuals with the short allele of 5HTTLPR are generally more responsive to environmental conditions; i.e., they are more likely to display aggressive or risky behavior when exposed to high levels of environmental stress (including discriminatory experiences), but *less* likely to display such behavior when raised in supportive environments (Gibbons, Roberts et al., in press; Simons et al., in press; cf. Belsky & Pleuss, 2009). Future analyses should examine whether these individuals are also more likely to respond to discriminatory experiences with lowered SC, but maintain higher levels of SC in more favorable environments.

SC interventions: Finally, the current results highlight the importance and potential of interventions that are intended to boost SC (e.g., Riggs, Sakuma, & Pentz, 2007), and those aimed at buffering against the stress of discrimination. In the former category, meta-analyses have suggested that programs intended to promote self-monitoring in social situations can be effective at reducing problematic use that is associated with low SC. Of course, this approach will not address the source of the problem (discrimination), but it may reduce unhealthy reactions to it (Walters, 2001). A prime example of the latter category is the SAAF program (Brody et al., 2006), which attempts to reduce substance use in Black adolescents by increasing Black identity and pride. One way this is done is by pointing out to Black adolescents that, as a group, Black adolescents use substances less than White adolescents. This kind of racial socialization has been shown to effectively change attitudes toward substance use and substance users, and in the process, reduce actual consumption of substances such as alcohol (Gerrard et al., 2006).

Conclusion—The long-term effects of early and cumulative exposure to discrimination among Black adolescents include an erosion of SC and an increase in reactivity to anger-producing events. Both of these effects are related to an increase in substance use and, presumably, other risky health behaviors as well. The current results provide additional evidence of the important role of discrimination in physical health disparities that exist between Blacks and Whites in the U.S. today.

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Figure 1.
A Latent Growth Curve Model of the Relations among Self-control, Discrimination, and Substance Use over time (Study 1).
* $p < .05$; ** $p < .01$; *** $p < .001$

Figure 2.
 A Structural Equation Model of the Relations among Early Discrimination, Self-control, Anger, and Substance Use (Study 1).
 $* p < .05$; $** p < .01$; $*** p < .001$

Figure 3.
Substance-related Word Associations as a Function of Discrimination Condition and Level of Dispositional Self-control ($\pm$ one SD from the mean; Study 2).

Table 1

Correlations, Means, and Standard Deviations of Primary Study Variables (Study1)

	1	2	3	4	5	6	7	8
1. W1 Disc	---							
2. W2 Disc	.42***	---						
3. W4 Disc	.21***	.33***	---					
4. W1 SC	-.18***	-.05	-.03	---				
5. W2 SC	-.06†	-.06	-.04	.34***	---			
6. W4 SC	-.10**	-.12**	-.13***	.16***	.25***	---		
7. W2 Substance use	.13***	.15***	.03	-.16***	-.16***	-.08	---	
8. W4 Substance use	.10*	.11**	.30***	-.08*	-.12**	-.13***	.13**	---
Mean	1.68	1.65	1.79	2.40	2.29	2.43	0.43	1.97
SD	0.57	0.57	0.60	0.42	0.40	0.33	0.96	1.90

Note: *N* ranges from 626 to 889. Disc = perceived racial discrimination (scale = 1–4); SC (Self-control) scale = 1–3; Substance use = sum of 10 items (no/yes) measuring alcohol, tobacco, and marijuana use (scale: 0–7).

† $p < .10$;

* $p < .05$;

** $p < .01$;

*** $p < .001$.