

Perceived Racial Discrimination and Health Behavior:

Mediation and Moderation

Frederick X. Gibbons

and

Michelle L. Stock

A chapter to appear in: B. Major, J.F. Dovidio, and B.G. Link (Eds.)

Oxford Handbook of Stigma, Discrimination and Health.

Oxford University Press.

Abstract

Several decades of research have documented a strong link between perceived racial discrimination and various health outcomes among African Americans (Blacks) in the US. These outcomes include health status (e.g., acute and chronic illness, obesity, and physical functioning) and health-relevant behavior (e.g., substance use, eating, and risky sexual behavior). This chapter focuses on the latter relation—that between the stress associated with perceived racial discrimination and health-risk behavior, primarily substance use and abuse. More specifically, the chapter examines a variety of factors thought to *mediate* this relation, the two primary ones being negative affect and self-control. This research has shown that discrimination has an impact on both factors, and these, in turn, directly affect substance use. We also examine several factors that have been shown to moderate the discrimination - health relationship. These include risk factors, such as coping style, and also buffers (protective factors), such as social support and effective parenting. Finally, we review research examining moderators that can be either risk-promoting or protective, depending on the individual and or the situation (e.g., genomics and racial/ethnic identity). Some research identifying individuals who appear to respond in a favorable or healthy manner to perceived discrimination is also reviewed. We conclude with recommendations for topics for future research in the area, with an eye toward implications for intervention and preventive-intervention, along with suggestions for ways to improve and extend the research paradigms that have been used in the past.

Perceived Racial Discrimination and Health Behavior: Mediation and Moderation

Racial discrimination is one of, and perhaps *the* most important, contributor to the significant disparity in health status that exists between African Americans (Blacks) and Whites in the United States (US) today. It has also been implicated in studies of health disparities between Whites and other minorities in the US and in other countries. There is consensus among researchers in the area that there are two primary paths of influence from perceived racial discrimination to health. The first is direct: the stress produced by discrimination, like other forms of stress, is associated with a variety of health markers and outcomes, both acute (e.g., blood pressure elevation; Ryan, Gee, & Laflamme, 2006) and chronic (e.g., inflammation; Lewis, Aiello, Leurgans, Kelly, & Barnes, 2010; metabolic syndrome; Hansen, 2015). The second pathway is indirect, through behavior: Again, like other forms of stress, perceived discrimination is associated with behaviors that may effectively mute the stress reaction, but, in the process, can increase risk for health problems, substance use being a prime example. In fact, numerous studies have documented a relation between perceived discrimination and use (Clark, 2014; Pascoe & Richman, 2009); many of those studies are reviewed in this volume (see the chapter by Richman, Pascoe, & Lattanner).

Most of the research on discrimination and health behavior has focused on perceived racial discrimination, primarily among the racial group that reports experiencing more of it than any other, Blacks (Chou, Asnanni & Hofmann, 2012). The central focus of our own research has been on understanding the nature of this relation. In particular, we have examined factors that help explain how and why perceived racial discrimination affects different types of health-relevant behaviors. This chapter reflects that emphasis: We begin with an overview of the relation between racial discrimination and health. We then focus on a specific health behavior, substance use, that places Blacks at increased risk for these negative health outcomes. This research includes both survey and experimental (laboratory) studies, with an emphasis on mediators (factors that help explain) and moderators (factors that

influence the strength) of the relation between discrimination and negative health outcomes. Such information is critical for the development of interventions that can effectively reduce the strength of the discrimination-health relationship. Finally, our review also examines these specific topics: effects of different kinds of discrimination, positive reactions to racial discrimination, experimental versus survey research, health risk versus protection, genetic moderation of discrimination effects, as well as a general critique of the area, and discussion of future research directions.

Health Effects of Racial Discrimination

Cancer, heart disease, obesity, and HIV infection are a few of the health disparities that exist between Blacks and White in the US. There are two key factors that these health outcomes share: they are all affected by the stress of racial discrimination and by substance use. Overall rates of cancer are higher in Blacks than Whites (DeSantis, Naishadham & Jemal, 2013), as are several specific cancer types, such as prostate and lung (Howlader et al., 2015). A number of physiological factors contribute to the development and progression (and prevention) of cancer, and many of those factors have been linked with racial discrimination and the stress it produces. C-reactive protein, for example, is a risk-factor for cancer, as well as a number of other diseases, and its production has been directly related to perceived discrimination (Goosby, Malone, Richardson, Cheadle & Williams, 2015). Day to day experiences with discrimination appear to cause dysregulated cortisol rhythms (Doane & Zeiders, 2014), which can promote heart disease, diabetes, and other problems. Cardiovascular reactivity is also elevated by discriminatory experiences (Guyll, Matthews & Bromberger, 2001), which increases risk for heart disease. Chae and colleagues (2014) reported that perceived racial discrimination is associated with shorter telomere length, which is an indicator of physiological aging. In short, there are several health outcomes that appear to be *directly* related to the stress associated with racial discrimination among Blacks in the US. Most of the work in this area, however, has focused on the *indirect* effects of racial discrimination on health status through its impact on health-relevant behaviors-behaviors that are often

prompted by stress--primarily substance use, but also overeating and risky sex. Those indirect effects are the focus of this chapter.

Racial Discrimination and Health Problems

From a health perspective, Blacks have been more affected by racial discrimination than other racial/ethnic groups. Obesity, for example, is a problem for many Americans, but rates are higher among Blacks than any other racial or ethnic group (Lincoln, Abdou & Lloyd, 2014), and that is reflected in higher rates of diabetes, heart disease, and elevated risk for cancer. Most of the behavioral antecedents to obesity are also higher among Blacks, including overeating (Brodish et al., 2011), maintaining a high-fat/cholesterol diet (Forsyth, Schoenthaler, Ogedegbe & Ravenell, 2014), and having a sedentary lifestyle (Chen & Yang, 2014). Each one of these risk factors has been associated with stress and with racial discrimination. McDonald, Terry and Tehranifar (2014) put the magnitude of these physical effects in some perspective, reporting that discriminatory experiences among Black women had more of an impact on their health status than did obesity (and obesity is a major health problem for Black women). Another factor associated with obesity and several other health problems is poor sleep patterns. Blacks tend to have worse sleep patterns than other racial/ethnic groups and, once again, this difference has been linked with the stress associated with racial discrimination (Slopen, Lewis & Williams, 2016).

Racial discrimination can also have an impact after the health problem has developed. Merluzzi, Philip, Zhang, and Sullivan (2015) found that Blacks diagnosed with cancer reported experiencing more discrimination than did Whites with the same disease and they were more likely to attribute that perceived discrimination to race. This attribution, in turn, affected their perceived quality of life. Interestingly, Merluzzi et al. also speculated that this perceived discrimination may have a negative effect on Blacks' ability to *cope* with the disease once it is diagnosed (e.g., they are more likely to use avoidant than agentic coping strategies). Perceived discrimination in the health care system is also likely to interfere with utilization of health care services: It appears to inhibit cancer screening (Crawley, Ahn,

& Winkleby, 2008), for example, and seeking health care services (Casagrande et al., 2007), and it promotes switching from traditional medical treatments to less-proven alternatives (e.g., herbal-based treatments; Thorburn, Faith, Keon, & Tippens, 2013). The behavioral factor that has received the most attention as a mediator of racial discrimination effects on health outcomes, however, is substance use.

Racial/Ethnic Differences in Substance Use

As discussed in Richman et al.'s chapter in this volume, the number of studies investigating the effects of perceived racial discrimination on health-impairing behaviors, especially substance use, has increased significantly since the influential Pascoe and Richman (2009) review article. These studies of the relationship between racial discrimination and substance use in Blacks have revealed an interesting developmental pattern that appears to be related to the cumulative effects of discrimination.

Developmental Patterns of Substance Use

Adolescence. Black adolescents tend to use substances less than White adolescents (Bachman et al., 2011), in spite of the fact that they are much more likely to grow up in environments that are conducive to risk (e.g., due to low SES and its concomitant problems, such as substance availability; Rodriguez et al., 2013). Several explanations have been offered for this tendency for less use early in life, including differences in religiosity and family ties (both appear to be stronger and therefore more inhibitory protective for Blacks; Ding & Crawley, 2010), and amount of discretionary income (Black adolescents tend to have less of it and it does facilitate use; Rote & Taylor, 2014). Two additional psychosocial factors have been identified that inhibit Black adolescent substance use and, theoretically, could act as buffers later in life. The first is social influence. Black adolescents appear to be less responsive than White adolescents to peer pressure and social norms (Mason, Mennis, Linker, Bares & Zaharakis, 2014), and that includes the "superpeer" pressure that comes from the media (e.g., the influence of movie characters on smoking and drinking; Gibbons et al., 2010a). The second factor has to do with racial identity: Because Black adolescents use substances less frequently, substance use is less a part of

(young) Black culture (Pugh & Bry, 2007), which means that Blacks who are more immersed in that culture—that is, those high in racial identity—are less likely to use.

Early adulthood: A racial cross-over. This pattern changes over time, however, as the risk benefit conferred to Black adolescents by their racial status diminishes in early adulthood, and appears to reverse in adulthood. This “racial cross-over” (Kandel et al., 2011) varies somewhat as a function of the type of substance. For alcohol, rates of use tend to remain lower for Blacks than Whites into adulthood; but, among those who drink, there appears to be a higher likelihood of alcohol-related problems for Blacks (Caetano & Clark, 1998; Witbrodt et al., 2014). For smoking and marijuana use, the crossover is more evident. Kandel et al. (2011) reported that Black smoking rates begin exceeding those of Whites sometime around age 29. Keyes et al. (2015) found higher rates of marijuana use for Blacks, especially females, whereas Chen and Jacobson (2012) found higher rates among Black adults for both smoking and marijuana. This crossover reflects the fact that most racial/ethnic groups show a significant decline in use in their early 20s, coinciding with significant life changes signaling more responsibility (e.g., employment, marriage, having children), a process referred to as “maturing out” (Finlay et al., 2012). Blacks, however, are less likely to do this.

Why a cross-over?

Once again, several explanations have been proposed for this racial difference (in maturing out), although relatively few have been examined empirically. Smoking cessation attempts tend to increase in the early 20s, but Blacks have more difficulty quitting, in part, because they are more likely to smoke menthol or flavored cigarettes (US Food and Drug Administration, 2013), which tend to be more addictive (Faseru et al., 2011). From a psychosocial perspective, there are several interpersonal and contextual factors that appear to be more important for Blacks in terms of desistance. One is the fact that the impact of close family ties and attentive parenting that had been protective for Black adolescents is significantly diminished when they leave the home. At the same time, the stress

associated with unemployment becomes more intense in early adulthood than it was in adolescence, and rates of unemployment are ~ 10% higher among Blacks in their 20s than among same-aged Whites (US Department of Labor, 2015). Also, Blacks are about six times as likely to be incarcerated as Whites (West et al., 2010), and rates of smoking are much higher among prisoners. Contact with inmates can also promote the habit after release, as can stress “aftereffects” of incarceration (Clarke et al., 2011).

Kandel et al. (2011) rank-ordered several factors as contributors to the crossover for smoking. They concluded that the most influential factor was lack of education, which is highly correlated with both smoking and cessation (Wetter et al., 2005). The second factor was marital status. In general, marriage has the greatest impact on substance use of any factor during early adulthood, and this effect is usually positive, that is, a reduction in use (Leonard & Homish, 2005). However, young Black adults are less likely than other young adults to marry (Danese et al., 2007). They are also more likely to experience relationship stress (McCabe et al., 2010); and relationship stress is more strongly related to health problems for Blacks than other racial/ethnic groups (Reed et al., 2013). In terms of overall impact, however, we would argue that the most important interpersonal factor was not included in Kandel et al.’s analysis, and that is discrimination. In other words, the effects of racial discrimination either interfere with efforts by young Black adults to reduce their use, or, for some, lead to escalation of use. Some effects of racial discrimination on use can actually be seen well before early adulthood, however.

The low level of substance use by Black adolescents is even more impressive in light of the fact that they must also deal with the stress associated with discrimination. Substance use typically begins in high school, and that is also when the relation between use and discrimination first emerges (Sanders-Phillips et al., 2014). In terms of individual substances, relatively few studies have looked at drug use (see below); however, relations with racial discrimination among Black adolescents have been found with both smoking (e.g., Guthrie et al., 2002) and alcohol (Terrell, Miller, Foster & Watkins, 2006). Similar results were found with Hispanic high school students for general use (Unger, Schwartz, Huh, Soto, &

Baezconde-Garbanati, 2014), and for smoking among Hispanic girls (Lorenzo-Blanco et al., 2011). In addition, longitudinal research has indicated that the *antecedents* of use can be identified earlier than high school, before actual use begins. Much of that research came out of the Family and Community Health Study, a panel study of the health behavior and health status of Black families in the US.

The Family and Community Health Study (FACHS)

Data collection for FACHS began in 1996 with 889 families in Iowa and Georgia, and has occurred every two to three years since that time. Wave 7 (W7) was completed in late summer of 2016. At W1, each family included an adolescent in 5th grade and a primary caregiver, most of whom were women, usually the biological mother of the adolescent. In addition to perceived racial discrimination, risk factors for health behavior and health status examined in FACHS have included various kinds of stress: financial, familial (e.g., father absence), and environmental (high crime rates). Protective factors have included, parenting style, racial identity, optimism, and supportive relationships. More recently, DNA has been collected allowing examination of genetic architecture as a risk or protective factor.

Effects of Racial Discrimination on Substance Use among FACHS Participants

Parents. Perceived racial discrimination has been assessed among all family members in FACHS at each wave using a modified version of the Schedule of Racist Events (Landrine & Klonoff, 1996). This measure assesses perceived unfair treatment by others that the respondent attributes to the fact that s/he is Black. An early FACHS paper (Gibbons, Gerrard, Cleveland, Wills, & Brody, 2004) looked at reports of racial discrimination and substance use in both the parents and their children. It was the first study to establish a prospective link between perceived racial discrimination and substance use and did so at a young age (12.5) among the children. In the process, it provided some evidence of the impact that racial discrimination can have on health behavior, in general, and also relative to other stressors. For the parents (*M* age 37 at W1), the correlation between W1 racial discrimination and W2 (age 39) use (drugs and problematic drinking) was stronger than the same correlation with any of the other stressors (e.g.,

neighborhood risk, financial hardship, relationship problems). In addition, racial discrimination predicted change in use both indirectly (through mediating factors, discussed below) and directly.

Adolescents. Among the adolescents, 90% reported some experience with discrimination at W1 (age 10.5), though for most it was minor. However, this perceived discrimination had a noticeable impact on their future behavior: the association with use two years later (age 12.5--20% reported some use by that age) was statistically significant. By age 15, reports of use had, of course, increased: 15% of the sample indicated they were using substances, 41% reported some lifetime use. That rate was twice as high among those in the top 25% of the perceived discrimination distribution as it was in the other 75% (Gibbons et al., 2007). Clearly, discrimination was affecting their health behavior. The question we have been addressing is how and why.

Mediators of the Relationship between Perceived Racial Discrimination and Health

Figure 1 depicts the ways we have hypothesized that perceived racial discrimination affects health outcomes. First, perceived discrimination affects health behaviors--specifically greater substance use and more risky sex-- and (negative) affect. Second, these two factors, health behavior and affect, reciprocally influence each other; and third, they both mediate the relationship between perceived discrimination and health outcomes. In the remainder of this section, we provide evidence for the mediational processes illustrated in this model, including the role of specific emotional reactions.

Type of Affect as a Mediator

The general pattern of the affect mediation has been perceived racial discrimination → negative affect (originally, depression and/or anxiety) → unhealthy behavior. In fact, numerous studies have shown this relation (Cuevas et al., 2014). In the FACHS sample, Gibbons et al. (2004) also found evidence of mediation by negative affect for both the adolescents and their parents: perceived racial discrimination was associated synchronously with negative affect at W1 and also predicted change in negative affect at W2, which then predicted change in use. The study also revealed a meaningful

relation across family members: at W1, parents' and adolescents' reports of discrimination predicted each other's negative affect. In the case of the parents, this effect lasted for several waves, which meant the adolescent's self-reports of early experiences with discrimination predicted the parents' self-reports of use and their general physical health status several years later. The same relation existed for the adolescents, but it was weaker, and disappeared by the time they were 15 or 16.

Subsequent studies broadened the list of negative affect measures in order to examine whether the *type* of affect mediating the racial discrimination to use relation makes a difference in terms of health outcome. Specifically, *anger and hostility* were added to the model. Besides being intuitive, there was precedent in the literature for this addition, in terms of both elements of the relation: perceived racial discrimination to affect and also affect to use. As might be expected, anger/hostility and anxiety and depression (i.e., externalizing and internalizing reactions) are both elevated by perceived discrimination, but the former relation appears to be stronger (Scott & House, 2005). Simons et al. (2006), for example, found more evidence of externalizing reactions to perceived discrimination than internalizing. Minior, Galea, Stuber, Ahern and Ompad (2003) reported that Black adult substance users were much more likely to say they got angry in response to discrimination than felt embarrassed by it (cf. Pittman, 2011); and that anger has been linked directly with use (Terrell et al., 2006). Similarly, Native Americans reported both internalizing and externalizing reactions to perceived discrimination in Whitbeck et al. (2001), but only the latter reactions were related to their substance use.

Regarding the second element of the relation (affect to use), in general, substance use, like perceived racial discrimination, is related to both internalizing and externalizing reactions; but, the externalizing relation, once again, appears to be somewhat stronger. This reflects a more basic association between affect and risky behavior: Experimental and survey studies have suggested that anger is related to risk taking (Curry & Youngblade, 2006; Lerner & Keltner, 2001), including substance use (Aklin et al., 2009). Depression, on the other hand, as well as state and trait anxiety, are not consistently associated with

risk taking (Hockey, Maule, Clough, & Bdzola, 2000); instead, they appear to be related more to risk avoidance (Rydell et al., 2008). Along the same lines, dual-processing studies in the social cognition literature have indicated that anger, more than sadness, prompts heuristic processing (Moons & Mackie, 2007), and risky behavior often involves heuristic processing, mostly because it includes less consideration of risk and risk consequences (Griffin, Dunwoody, & Yang, 2012).

Using FACHS data, Gibbons et al. (2010a; Study 1) examined internalizing affective response (depression and anxiety) vs. externalizing affective response (anger/hostility) as mediators of the W1/W2 perceived discrimination to W3 use (alcohol and drugs) relation in the parents and the adolescents. As expected, the two types of negative affect were correlated, and both were predicted by perceived discrimination. Moreover, when either type of affect was included by itself in the structural model, there was a significant indirect effect from discrimination to use through each type (as in Gibbons et al., 2004). When they were both included in the model, however, anger/hostility, but not depression/anxiety, predicted subsequent use. These survey results were replicated in lab studies in which discrimination was manipulated (Gibbons et al., 2010b, Study 2; Stock et al., 2011). Thus, these studies provided some evidence of differential mediation by the two kinds of affect.

Differential mediation. In fact, type of affective response to discrimination appears to be a critical factor in terms of impact on health and health behavior, and it is one with important intervention implications. Gibbons et al. (2014) pursued this question in a subsequent study focusing on problematic alcohol use, and including an additional health outcome—health status. We expected externalizing to be associated more with substance use, and internalizing more with (poor) health status. This “differential mediation” hypothesis was based on previous research suggesting that externalizing reactions are often antecedent to risky behaviors, whereas internalization is more often associated with somatization and medical problems (Holahan et al., 2010). The assumptions were that a) internalizing reaction would link perceived discrimination with (change in) health problems, indexed by self-reports of overall health (a

good predictor of morbidity and mortality), specific health problems, and the extent to which health problems interfered with physical functioning; and b) externalizing reactions would link perceived discrimination with changes in problematic alcohol use. Discrimination was assessed at W2 (M age 39); affect was assessed 3 years later, and then health status and drinking 3 years after that. Reports of each outcome had been assessed at W1 (age 37), so change over time could be examined. Stabilities of health status and problematic drinking were both very high across the 8 year period. Nonetheless, perceived racial discrimination was associated with changes in those outcomes in the anticipated differential pattern: discrimination predicted increases in both anger/ hostility and depression/anxiety; however, whereas depression/anxiety then predicted health problems but not use, anger/hostility did the opposite—it predicted use but not health status. The corresponding indirect paths were also significant: perceived discrimination affected substance use through externalized affect and it affected health status through internalized affect. The next step in this line of research will be to examine which factors (e.g., individual differences such as optimism, racial identity, and social support) predict type of affective response to perceived discrimination, and therefore type of health outcome. Another related factor that has been linked with both discrimination and unhealthy behavior, including substance use and risky sex, is self-control; we have examined those relations in FACHS.

Self-Control as a Mediator

In a series of studies, Richeson and Shelton (2007) had White and Black college students interact in the lab and then assessed the impact of these interactions on their self-control. Results indicated that close interactions, even when externally sanctioned, as these were, involved psychological effort for members of both groups. Specifically, they appeared to deplete self-regulatory resources, as evidenced by poorer performance on Stroop tests by both groups of students. Based in part on these studies, we hypothesized (Gibbons et al., 2012a) that if brief interactions could negatively affect self-control, then presumably years of experience with interracial interactions, most of them longer and more

consequential, many of them more aversive—in other words, repeated exposure to racial discrimination—would lead to an erosion of self-control. That hypothesis was tested with FACHS adolescents.

As in most FACHS analyses, a variety of measures that have been associated with perceived racial discrimination and substance use in past research (e.g., risk-taking tendencies, neighborhood risk and integration, parent use, SES) were controlled. Outcome was change in use (smoking, drinking, drugs), assessed at W2 and again at W4 (*M* ages 12.5 and 18.5). As expected, discrimination predicted W2 use, and self-control predicted use at both W2 and W4. Of more interest, change in perceived discrimination predicted change in self-control, which, in turn, was a strong predictor of W4 use. Subsequent analyses indicated that anger and self-control were affected directly by perceived discrimination and both mediated its effects on change in use. In a follow-up, Molloy, Stock, and Gibbons (2016), using a (new) sample of Black and White young adults, found that lower self-control mediated the relation between perceived discrimination and reports of use among the Black group, but not the White group. Recent studies have examined discrimination's effects on another health behavior related to use: risky sex.

Perceived Racial Discrimination and Sexual Behavior

Sexual behavior and substance use have a lot in common, including evidence of relations with negative affect, health risk, and discrimination. The relation between perceived racial discrimination and risky sex has been examined in FACHS and a few other studies. For LGBT (lesbian, gay, bisexual, and transgender) populations, that discrimination may also involve sexual orientation, sometimes in addition to race, so there is potential ambiguity in terms of what is prompting the risky behavior. Some of that research is covered in other chapters (XXX), so we focus here on research that looks at perceived racial discrimination as an antecedent and (risky) sex as an outcome. Reed, Santana, Bowleg, Welles and Horsburgh (2013) found that reports of racial discrimination among Black male adults were linked with reports of buying and/or selling sex and also engaging in unprotected sex. Longitudinal analyses with FACHS adolescents indicated that cumulative experiences of racial discrimination between the ages of

10 and 19 were associated with sexual risk-taking at age 22 (more partners, sex under the influence, lack of condom use; Stock et al., 2013). In a follow-up study with a different sample of young Black adults, Molloy et al. (2016) again found that racial discrimination was associated with reports of risky sex behavior and also with related *cognitions* reflecting risk behavior—i.e., higher perceived vulnerability to future HIV infection. Risk cognitions, such as perceived risk and attitudes toward risky behaviors, have been associated with discrimination and risky behavior in a number of studies (see Figure 2 below).

Cognitive mediation. Kogan et al. (2015) examined mediation of the racial discrimination to risky sex relation among Black males (*M* age 18). Consistent with the model of reciprocal influences presented in Figure 2, these researchers found that perceived racial discrimination was associated with psychological distress (negative affect). This negative affect, in turn, was again related to a change in cognitions--attitudes toward risky sex became more favorable (e.g., more acceptance of casual and unprotected sex)--and an increase in reported affiliation with individuals engaging in risky sexual behavior. These two factors then predicted an increase in number of sexual partners.

Social mediation: affiliation. In fact, increased affiliation with risky peers, apparently in response to discrimination, has been found in several studies (Gibbons et al., 2004; 2007). Using FACHS data, Roberts et al. (2012) assessed the effect of W1 (age 10.5) perceived discrimination on W4 (age 18.5) self-reports of risky sex, including number of partners, condom use, and having sex after substance use. Mediators included negative affect and affiliation with risky peers (those engaging in substance use, delinquency, and sex), and attitudes toward risky sex (e.g., acceptability of sex without a condom). Once again, early experience with racial discrimination had an important impact: it was significantly correlated with W3 attitudes, and strongly related to all other mediators, as well as risky sex. In the multivariate analyses including all predictors and mediators, W1 negative affect predicted increases in affiliation at W2, which, in turn, predicted increases in favorability of attitudes toward risky sex and affiliation at W3. Finally, W3 affiliation and attitudes predicted risky sex at W4. In these studies, the discrimination effects

were also moderated in an interesting fashion, in one case, by parenting style, and in another by racial- or self-affirmation; these patterns are described in the moderation section below.

Laboratory Studies Manipulating Perceived Discrimination

Although longitudinal studies can provide useful information about the relations among predictors and outcome measures over time, inferences about causality can be made much more confidently from data based on experimental studies conducted in controlled laboratory settings. In fact, most of the FACHS survey studies described here have been accompanied by laboratory studies. Discrimination has been manipulated in these studies in two ways. The first is simply envisioning a discriminatory experience of some kind (Yoo & Lee, 2008; e.g., “imagine yourself in the following situation...”) or reflecting back on a personal discriminatory experience. The second is engaging in a computer game of social exclusion, called “Cyberball” (Williams, 2007). Participants play catch online with 2 or 3 other “players” who, unbeknownst to the real participant, are bogus. All players are represented by avatars, but bogus photos can be presented on screen, which allows for manipulation of the players’ characteristics, including race and gender. After tossing the ball a few times to the participant, the bogus players stop throwing the ball to him/her. This kind of social exclusion has a significant impact on participants (Williams, 2009); and, as one might expect, it is attributed to some form of racial discrimination when the other players are of a different race (Goodwin, Williams & Carter-Sowell, 2010; Stock et al., 2013)—especially when those players are White and the participant is Black.

In the first study, Gibbons et al. (2010a; Study 2) brought FACHS participants into the lab to participate in a study intended to replicate the relations found in the first survey study (Gibbons et al., 2010b; Study 1). Because they were members of FACHS, considerable information on these participants, including their perceived racial discrimination and use experiences was available. The envision technique was used—participants imagined a situation at work that either did or did not involve racial discrimination. Their affective states were then assessed, followed by a word association task (see

below), and then a measure of their willingness to use drugs (the same measures they had completed in the FACHS survey). Results indicated that thinking about racial discrimination once again elevated anger more than depression or anxiety. Envisioning discrimination was also associated with a significant increase in willingness to use drugs. Finally, anger (and not depression or anxiety) mediated the effect of the discrimination manipulation on willingness.

Cognitions. We used data from the same lab study to conceptually replicate the longitudinal self-control analyses from the FACHS survey. The new data were implicit measures of risk—thoughts about substances—along with dispositional measures of self-control from FACHS. In Gibbons et al. (2012a; Study 2), after envisioning the discrimination scenario or not, and reporting their affect, participants were presented with a word association task that included double-entendre words related to substances (roach, pitcher), and told to respond with the first word that came to mind. As expected, more substance-related associations were presented by those in the Discrimination condition, especially if they were low in dispositional self-control. Once again, this relation was mediated by reports of anger (in response to the envisioned situation). Stock et al. (2011) found the same pattern using the exclusion ball-tossing paradigm, Cyberball (described above), to manipulate perceived discrimination. Young Black adults from the community (M age = 22) who were excluded by a group of White “players” attributed the exclusion to racial discrimination; and, among those participants with some history of previous substance use, this exclusion / discrimination was associated with more thoughts of substances.

Risky sex. Evidence that the increase in affiliation with “deviant” peers may be at least partly a reflection of a coping effort can be seen in another Cyberball study by Stock et al. (2013; Study 2). They assessed willingness to engage in both risky sex and substance use separately after exclusion (or not) by White “players,” and then compared the mediational paths of the two types of risky behavior. These analyses indicated that the relation between exclusion and risky sex was mediated by increased willingness to use substances, but not vice-versa; that is, the exclusion to substance use relation was not

mediated by changes in sex willingness. The same pattern emerged in analyses of FACHS data (Stock et al., 2013; Study 1). In this case, early discrimination directly predicted self-reports of both substance use and risky sex at W4; but, whereas W4 use predicted increases in risky sex from W4 to W5, W4 risky sex did not predict increases in use from W4 to W5. It would appear, then, that the desire to reduce the pain associated with the exclusion is a primary motive that is reflected in the increased interest in substances and companionship. The sexual willingness, on the other hand, may be secondary-- a result of the desire to affiliate and to use substances--both enhanced by the exclusion/ perceived discrimination. Given the importance of the issue (e.g., from an HIV/STI perspective), further investigation into these reactions to exclusion and racial discrimination is needed.

Moderators of the Discrimination → Health Behavior Relation

Determining mediation of the racial discrimination/health connection is important because it provides some insight into the question of why perceived racial discrimination has the effect that it does. At the same time, identifying factors that *moderate* the relation can provide information about strategies that might be used to counter these effects, and for whom these strategies might work best. A number of studies have looked at moderating factors, some of which are modifiable, and have, in fact, provided information that could be--or has been--used in intervention efforts (see below). These moderators are either risk-promoting or protective (buffers) and include intrapersonal factors, such as coping style, racial/ethnic identity, and racial socialization; environmental factors, such as neighborhood integration and neighborhood risk; familial factors, such as parenting style; interpersonal factors, such as social support; and genomics. The first question here is the most basic one: what evidence is there that substance use is, in fact, a means of coping with the stress associated with discrimination?

Coping Style

Gerrard et al. (2012) used several coping scales (e.g., the brief COPE; Carver, 1997) to assess the extent to which participants reported they use substances to help them cope with stress. These scales

were examined as moderators of the perceived discrimination to use relation in two lab studies and in the FACHS data set, all controlling for previous use. Results were consistent across all three sets of analyses: a) racial discrimination was related to use and/or willingness to use, but it was not associated with use as coping, so there was no evidence that the coping style was a *reaction* to the discrimination; b) the Racial Discrimination x Coping interaction predicted changes in alcohol/drug willingness and/or use, as those who said they used substances to help them cope with stress were more likely to do so if they also reported a lot of discrimination; and c) those who did not endorse this style reported no changes in use--whether experiencing/envisioning discrimination or not. In short, the studies supported the common assumption that the relation between perceived racial discrimination and use found in many studies is, in fact, evidence of an effort to cope with the stress produced by the discrimination.

Type of Discrimination as a Moderator

Most of the research concerning discrimination and health behaviors has looked at racism, but some studies have examined other types of discrimination, primarily sexual orientation, gender, and weight. Sutin, English, Evans and Zonderman (2014) reported that perceived gender discrimination was associated with more smoking in older women. Several studies (discussed by Major, Tomiyama, & Hunger in their chapter in this volume) have identified “ironic” effects of weight-based discrimination, suggesting that it can lead to overeating and weight gain. A small number of studies have actually compared effects of racial discrimination with those of other types of perceived discrimination. Peterson, Stock and Zucker (2015), for example, found that perceived racial discrimination was associated with self-reports of engaging in risky sex (after using substances) in Black women, but perceived gender discrimination was not. Paul et al. (2014) examined perceived discrimination due to race and sexual orientation among ethnic minority MSM and found that perceived racial discrimination was directly associated with their polydrug and stimulant use, but perceived homophobia was not. Similarly, in a sample of Black LGB adolescents, Thoma and Huebner (2013) examined the effects of

multiple forms of perceived discrimination on negative affect (depression and suicidal ideation) and on substance use. Perceptions of both antigay and racial discrimination predicted negative affect, but racial discrimination was more strongly associated with use than was antigay discrimination.

Using an older sample of Black and Hispanic HIV+ MSM, Bogart et al (2013) assessed perceptions of racial discrimination, and discrimination based on sexual orientation and HIV status. Black MSM reported a fair amount of discrimination (percentages reporting each type: HIV status = 38%; race/ethnicity = 40%, sexual orientation = 33%); and each type was associated with lower medical adherence. But, in the multivariate model (including all types of perceived discrimination, controlling for SES, age, etc.), only racial discrimination was significant. Perceived racial discrimination also predicted CD4 cell count, viral load, and emergency room visits for the Blacks. For the Hispanics, the combination of all three types of perceived discrimination predicted AIDS symptoms. More generally, these studies have suggested that perceived racial discrimination may have more of an impact on health than perceived discrimination based on other factors—but perhaps more so for Blacks. This issue of multiple forms of perceived discrimination or stigma within individuals will become more relevant (and more complex) as US society becomes more diverse. We know that multi-race/ethnicity adolescents are more at risk for substance use (Choi et al., 2006), as are LGBT adolescents (Marshal et al., 2008). That may be changing, as attitudes toward sexual diversity improve, but we don't know. This is an important issue with significant intervention and prevention implications that is definitely worthy of additional research.

Risk Factors

Quite a few moderation studies have been concerned with protective factors, and in some instances, an inference can be made that the absence of a protective factor is effectively a risk factor. Latzman et al (2013) reported that Black college students were more likely to report alcohol problems if they had experienced discrimination and were low in a tendency toward premeditation, which is a form of self-control—a trait that has been linked repeatedly with substance use in the past (Wills et al., 2010).

In this case, perceived discrimination and self-control were correlated (cf. Gibbons et al., 2012a), which suggests the possibility that self-control is both a mediator and a moderator of the discrimination to problematic use (see Figure 3). In other words, perceived discrimination lowers self-control, which then can: a) lead to use directly, or indirectly through increased vulnerability to anger (Tangney, Baumeister & Boone, 2004); and b) increase reactions to subsequent perceived discrimination (e.g., negative affect and lowered self-control) and therefore the likelihood that future discrimination experiences--and presumably other types of stress as well--will lead to an increase in risky behavior. Such Stressor x Stressor interactions (e.g., increased vulnerability to other risk factors due to prior discrimination experiences) are likely to be the focus of more research in the future.

Moderators: Buffers

As strong as the racial discrimination to risky behavior relation is, it is encouraging to know that several factors have been identified that have been shown to diminish, or buffer, the relation. Most of this work has examined religiosity, parenting style, or culture as buffers.

Individual differences. Given the presumed role that it plays in protecting Black children from risky behaviors (Ding & Crawley, 2010), there is not much evidence indicating that religiosity affects reactions to perceived discrimination. Horton and Loukas (2013) did find that *negative* religious coping (basically, a strong fear of God) increased the effect of racial discrimination on Black adolescents' use of tobacco, but there are very few studies demonstrating such an effect. On the other hand, there is evidence that religiosity, in general, is negatively related to substance use in Black adults, and that is important, even though some of that effect may be attributable to the personalities of religious individuals rather than just the religiosity itself (Wills, Yaeger & Sandy, 2003). Similarly, the salutary effects of an optimistic outlook / disposition are well-documented in the literature (Goodin & Bulls, 2013), but with few exceptions, this positive impact has not been looked at *vis a vis* perceived discrimination.

Social support and parenting. Another protective factor that is common in the health literature but has seldom been looked at as a buffer of the stress associated with perceived discrimination is social support. Nonetheless, the buffering relation is logical, and one study did show the anticipated effect. Bowleg et al. (2013) replicated the finding of a positive relation between perceived racial discrimination and risky sexual behavior in Black males, but also found that this relation was significantly reduced among men who reported high levels of social support. Kogan et al. (2015) found similar results using a factor closely related to social support: *effective parenting*. Perceived discrimination was associated with risky sexual behavior (multiple partners) in Black males, and that effect was mediated by attitudes toward risky sex and affiliation with peers engaging in risky behavior. The relation was also buffered by effective parenting, defined as fostering harmony in parent-child relations as well as racial socialization. Due in part to its intervention potential, parenting has also been a target of several FACHS studies.

Parenting and substance use. In FACHS, effective parenting has been defined as monitoring, good communication, and providing consistent discipline, and it has been based on reports from both the parent and the child. In Gibbons et al. (2004), the construct had a main effect on willingness to use substances and self-reports of actual use. It also buffered against the effects of perceived discrimination on willingness to use substances in both studies (lab and survey) of Gibbons et al. (2010a), discussed earlier. In addition, in these studies, the effect was in the form of moderated mediation, which provided useful information about the buffering process. The mediator was anger (externalizing), which was positively related to perceived discrimination in the overall sample. However, that relation was nonsignificant (and significantly weaker) for participants whose parents had an effective parenting style. As a result, the perceived discrimination to use relation was also nonsignificant for that group. Thus, the parenting effect was attributable primarily to its buffering effect on the perceived racial discrimination/externalizing mood relation. Moreover, in the accompanying lab study, drug willingness was significantly

elevated only among those participants who were high in perceived racial discrimination *and* did not report receiving effective parenting.

Changes in parenting. Intervention implications can be seen in another FACHS study that included parenting as a protective factor. Roberts et al. (2012; discussed earlier) showed that parenting had a strong effect on risky sex, and also buffered the effects of perceived discrimination. That buffering followed an interesting pattern. Adolescents' reports of affiliation with risky peers at W1 predicted an *increase* in the effectiveness of the parents' style of parenting (reported by both the adolescent and parent) from W1 to W2, and this increase was strongly associated with a *decline in deviant affiliation* from W1 to W2 and W2 to W3. It appears, then, that the parents recognized there was reason for concern in their child's behavior (social network), and they responded to it—successfully. This pattern not only illustrates how the parenting process can work, but in so doing, provides encouraging information about the effectiveness of a factor that is clearly modifiable: Enhancing effective parenting skills has been demonstrated repeatedly in the past (Spoth et al., 2013). Parents and guardians also play a large role in the development of another buffer against the harmful effects of racial discrimination, this one involving culture.

Cultural Buffers

Racial identity. Racial identity refers to an aspect of self-concept and social identity that derives from individuals' knowledge of their ethnic or racial group membership and the significance, attitudes, and meaning they attach to that group membership (Phinney, 1992). The construct, in one form or another, has been widely examined as a moderator of perceived racial discrimination (Sellers & Shelton, 2003). This relation has been complicated somewhat, however, by measurement issues, including the fact that the construct is considered by many to be multidimensional, and the various components (subscales) do not always have congruent effects, especially with regard to substance use (Gray & Montgomery, 2012). Generally speaking, racial identity among Black adolescents is associated with less

use, as well as more negative attitudes toward substances, and a perception that use is nonnormative in the Black community (Caldwell et al., 2004; Pugh & Bry, 2007). Evidence of this also comes from FACHS. Stock, Beekman and Gibbons (2016) examined the effects of several types of racial socialization and found that adolescents' reports of one type--cultural socialization --buffered the effects of perceived discrimination on their reports of risky sex (more partners, sex under the influence) and substance use, especially among the females. However, another form of racial socialization--*promotion of mistrust*--was not protective; in fact, high levels of mistrust were associated with higher levels of risky behavior among adolescents who also reported high levels of discrimination. These effects were significant controlling for supportive parenting in general (as well as SES, age of sexual onset, and risk-taking tendency) suggesting that the harmful effects of perceived discrimination among Black adolescents can be mitigated or enhanced depending on the type of racial socialization they have received.

Further evidence of the positive effects of racial/ethnic identity comes from studies showing negative health consequences when that identity is low, or even negative. Chae et al. (2014) used the implicit attitude test (IAT) to assess the extent to which Black men had internalized *anti-Black* racial bias, and found that those with more negative internalized attitudes were more affected by reports of perceived racial discrimination. In this case, the effect was physiological: they had shorter telomere lengths, which is a sign of systemic aging. It should be pointed out, however, that the evidence is not entirely consistent. Some have found that high levels of racial identity are associated with more vigilance regarding racial discrimination and consequently more negative reactions to it (Burrow & Ong, 2010). The majority of studies of racial/ethnic identity, however, have suggested its effects are positive.

Identity affirmation as a buffer. Several studies have examined candidate buffers in the lab, and in so doing, have provided information potentially useful for the design of effective interventions. In a lab study with FACHS participants, Stock et al. (2011; Study 1) found that racial identity (Phinney, 1992) eliminated the effect of envisioning racial discrimination on substance-related cognitions and willingness

to use. High-identity participants reported virtually no use cognitions of any kind, whether or not they had envisioned discrimination. In Study 2, Black participants from the Washington, D.C. area were either excluded or not by White “players” in the Cyberball game and then later reported their willingness to use drugs and to drink heavily at a party. In the interim, half of them were given a racial identity affirmation (“...think about what it means to you to be an African American”). Among those with some history of substance use, the exclusion led to an increase in willingness, as in previous studies, but *not* if they had engaged in the affirmation after it happened.

Again, with an eye toward intervention implications, Stock and Gibbons (2016) compared the buffering effects of a racial-affirmation with that of a *self*-affirmation among young Black adults after social exclusion (Cyberball) by Whites. The outcomes were risky sex and substance use willingness, and risk cognitions (word associations). As expected, exclusion was associated with increases in all risk cognitions. For the use measures, racial affirmation worked better as a buffer, whereas self-affirmation was more effective in countering the effects on sexual risk-taking. One interpretation of these buffering effects is that exclusion (perceived discrimination) can have an impact on both self- and collective esteem. Recent events suggest discrimination against Blacks in the US is alive and well--but racial affirmation can counter this type of impact. On the other hand, engaging in sexual behavior can address a need for affiliation (and perhaps intimacy) that comes with exclusion and perceived discrimination; it can also boost self-esteem (Houlihan et al., 2008) and help regulate mood (Pomery, 2009). Self-affirmation can counter the insult to self-esteem and perhaps reduce this need for sex/affiliation. Clearly this is speculative; but the effects here are reliable and have potential for beneficial application.

Genomics

Another type of moderator examined in FACHS is an individual difference factor that appears to act as both a buffer and a risk factor, and does so in an interesting manner. Like many researchers examining the effects of stress on health status and health behavior, those studying the effects of racial

discrimination have turned their attention more to biological indicators and moderators of these stress reactions. In other words, to what extent do biological factors influence how discrimination affects health? The specific biological factor addressed in this research is genetic architecture.

Gene x Environment (G x E). A major issue in the G x E area is how to identify the candidate genes thought to moderate (stressful) environments (Dick et al., 2015). In one FACHS study, for example, two genes were chosen based on their established connections with stress and risk behavior: functional polymorphisms in the dopamine receptor gene (DRD4, 7-repeat allele) and in the serotonin transporter gene (5-HTTLPR). Risk alleles on these two genes have been linked with relevant behavior in previous studies: e.g., risk taking and substance use for DRD4 (Conner, Helleman, Ritchie, & Noble, 2010); and increased sensitivity to threat and punishment for 5-HTTLPR (Brody et al., 2011). A genetic index (combining the two risk genes) was examined in Gibbons et al. (2012b) as a moderator of the effects of three different types of (W1) stressors: environmental (e.g., neighborhood risk), familial (e.g., use by parents), and perceived racial discrimination, on two different types of outcomes: *risk cognitions* (e.g., risky sex and substance use willingness) at W3 and W4, and overall *resilience* at W5 (e.g., mental and physical health, friend and family relationship success). As expected, all three kinds of stress were associated positively with risk and negatively with resilience. However, only W1 perceived racial discrimination was directly related to W5 resilience (assessed 11 years later). In addition, only the perceived discrimination effects were moderated by genetic risk, but in an unusual manner.

Sensitivity. As expected, the combination of risk alleles and high levels of perceived discrimination was associated with the highest levels of risk cognitions. However, the putative “at-risk” group of participants actually reported *significantly lower* amounts of risk cognitions if they also reported very little perceived discrimination. This type of cross-over G x E interaction has been found frequently in recent studies and has been identified as “genetic sensitivity” or “plasticity” (Belsky & Pleuss, 2009). The term means those with certain (“sensitivity”) genes are not necessarily “at risk,” but instead are simply

more responsive to their external stimuli. So, they tend to have more difficulty in stressful environments, but they actually *do better* in environments that are supportive. In this case, they responded more negatively to high levels of perceived racial discrimination in terms of health risk cognitions, but reported *less risky cognitions* than less sensitive participants in the (relative) absence of discrimination stress. A follow-up study (Gibbons et al., 2016a) investigated reported use (not just cognitions), and also mediation: what role do anger and reduced self-control play in the demonstrated effect that perceived discrimination has on use? Results indicated that W1 perceived discrimination was related to W4 use, but only among the sensitive participants. In addition, this effect was attributable to the fact that these participants reported more anger and less self-control when they indicated they had experienced a lot of discrimination; importantly, however, they reported significantly *more* self-control and marginally *less* anger, if they had experienced low amounts of perceived racial discrimination.

Implications. In light of the large body of literature documenting harsh effects of perceived racial discrimination on health, we believe these genetic studies provide reason for optimism. First, one study (Gibbons et al., 2012b) identified a group of Black adolescents for whom perceived racial discrimination appears to have relatively little impact—at least from an emotional and cognitive perspective—those without sensitivity genes (about 1/3 of the sample). Second, from a translational perspective, these results may provide useful information that can facilitate the development of new prevention and intervention efforts aimed at reducing substance use in Blacks. For example, Brody et al. (2009) found that participation in the Strong African American Families program (SAAF; Brody et al., 2004; Gerrard et al., 2006) reduced the likelihood that Black adolescents with 5HTTLPR risk alleles would use substances (cf. similar results reported in Brody et al., 2013, from two other preventive interventions). The current results also suggest that the Black adolescents most at-risk—i.e., those high in sensitivity who have experienced a lot of discrimination—may benefit from intervention efforts that attempt to dampen anger reactions (Larson & Lochman, 2010), perhaps by targeting parenting practices that help Black

adults prepare their children for the experiences of discrimination they are likely to face (Burt, Simons, & Gibbons, 2012). Given its relation with perceived racial discrimination, similar effects may result from interventions intended to boost self-control (Muraven, 2010).

Positive Reactions to Perceived Racial Discrimination

One final issue (a kind of moderator) is worth mentioning because of its translational implications, even though the results are preliminary. A small group of studies has documented positive responses to perceived racial discrimination among some Blacks. Forsyth et al. (2014) examined data from Black adults enrolled in the CAATCH trial (Fernandez et al., 2011) and found a negative relation at baseline between perceived racial discrimination and healthy behaviors (healthy diet, medication adherence). But, perceived discrimination then predicted *improvements* in diet over the course of the trial, suggesting that participants who had experienced a lot of discrimination were more responsive to the intervention. Several studies have also provided evidence of increased physical activity associated with perceived discrimination, but with important gender moderation. Brodish et al. (2011), for example, found that accumulated perceived racial discrimination (ages 14–21) predicted unhealthy eating in young Black adults and more substance use among the males, but it also predicted more exercise in the women. Corral and Landrine (2012) replicated the common perceived discrimination to smoking relation, but also found a positive relation with physical exercise. Essentially the same pattern was found by Borrell et al. (2013)—more smoking and drinking associated with perceived racial discrimination, but also more physical activity (no gender differences were reported). Because they used the CARDIA dataset (Krieger & Sydney, 1996), Borrell et al. also had perceived racial discrimination measures with Whites and those data replicated the perceived racial discrimination results with smoking and, to a lesser extent, physical activity. Finally, analyses conducted with FACHS data also showed a significant relation between perceived racial discrimination and both physical activity and healthy eating (fruits and vegetables), but again, only among the females (Gibbons, Kingsbury & Gerrard, 2016b). To date,

however, none of the analyses or studies has provided clear evidence of moderation—what factors besides gender can predict who responds to perceived racial discrimination stress in a positive fashion. For a number of reasons, including translational implications, this should be a focus of future research.

Analysis and Critique

The research in this area has established a strong and reliable relation between perceived racial discrimination and several kinds of health-impairing behaviors, and it has identified several factors that mediate and moderate this relation. There are aspects of some of the studies, however, that reduce the clarity of the message and suggest topics for future studies as well as methodological issues that need to be addressed. In this section, we identify measurement and methodological issues that should be considered when interpreting the pattern of findings in the literature and in designing new research.

Measurement

A number of researchers have essentially equated perceived racial discrimination with “perceived mistreatment” (e.g., “I have been treated unfairly”). Although they both can be stressful and may have similar effects on behavior, perceived racial discrimination and perceived mistreatment are not the same thing. Of course, it would be naïve to assume that all episodes of unfair treatment have clear cut motives or explanations in the mind of the recipient or the perpetrator, and many individuals have membership in more than one stigmatized group, creating ambiguity about the cause of the discrimination. But, more often than not, members of minority groups can figure out if the discriminatory behavior was due, at least in part, to their race or ethnicity. If the scale does not include some mention of the cause of the perceived mistreatment, with race/ethnicity as an option, then conclusions about the impact of perceived racial discrimination should not be drawn. Along similar lines, a number of studies have included very short perceived racial discrimination scales, in some cases a single item (e.g., “*How often have you been treated unfairly because of your race?*”) The temporal reliability of such scales is often not impressive (Krieger, Smith, Naishadham, Hartman, & Barbeau,

2005). Reasonable scales are available that are short, with good evidence of reliability and validity (e.g., the Schedule of Racist Events; Landrine & Klonoff, 1996). We suggest more effort be devoted to choice and use of these scales, and perhaps the development of new ones.

Another measurement issue relates to *chronicity*. One would expect that self-reports of racial discrimination would tend to be fairly stable —perhaps more than reports of substance use. That is largely an unanswered question, however, and that reflects an important gap in the literature. In fact, surprisingly few studies have looked at perceived discrimination over time. Instead, a number of researchers have equated frequency with chronicity. Thus, a response of “a lot” to a question asking “How often have you been treated poorly due to your race?” is interpreted as chronic discrimination. There are two drawbacks with this type of measure. One is that it does not allow for assessment of the cumulative effects of perceived discrimination. The second is that such reports are likely to conflate chronic and acute experiences; that is, the chronic reports are likely to be influenced by recent experiences. Chronic perceived racial discrimination is an important element in several models of discrimination effects (e.g., the weathering hypothesis; Geronimus et al., 2006), and it has been central to explanations of the racial crossover effect. It should be assessed whenever possible.

Methodology

Lab. Although there have been a number of high quality studies that have looked at perceived racial discrimination in the lab, relatively few have included health-relevant outcomes. This is attributable in part to the fact that in the US, health-social psychology has not been a popular subdiscipline (Klein et al., 2015), perhaps because health outcomes are not easily assessed in the lab. However, social psychology has a long history of viewing proximal antecedents as proxies for behavioral measures (e.g., behavioral intentions), and has been mostly accepting of the validity of self-reports of socially undesirable or illegal behaviors (more so if backed up by physiological measures, as has been the case with smoking; Philibert et al., 2015). Research within the last decade has also documented the predictive validity of the

behavioral willingness construct (Gibbons, Gerrard, Stock, & Finneran, 2015), suggesting it can be effective as a proximal antecedent to risky behaviors among adolescents (Gerrard et al., 2008).

Survey. Cross-sectional studies are still common in the literature and certainly have their place, but survey studies are much more informative if they are longitudinal. That is more of an issue for outcome measures, especially if they involve substance use during adolescence and early adulthood. Not only does use vary considerably during these periods-- and vary differentially as a function of race/ethnicity (e.g., the racial cross-over effect)—but this variance is likely to be very informative: Trajectories of use in adolescence often predict problematic use later on (Tucker et al., 2005). Moreover, as with any survey study, “third variables” that have been shown to be related to perceived discrimination and/or health outcomes can confound the results and should be controlled in the analyses. A good example is the dispositional factor of negative affectivity (Watson & Clark, 1984). Those with a generally negative or pessimistic outlook may be more likely to report racial discrimination *and* more of the mediators, such as negative affect or anger / hostility, as well as use. Another example is SES, the effects of which could easily be misinterpreted as due to racial discrimination or race. Fortunately, controlling for SES in studies of perceived racial discrimination is common—as it should be--and most of the studies doing so have uncovered evidence of independent effects for racial discrimination and SES. Obviously, there is much work to be done on this topic. Some possible foci for these future studies are presented briefly below.

Future Focus

Although there is currently a substantial literature on the relation between perceived racial discrimination and health, we believe future research might productively focus on these three important areas: a) expanding an understanding of moderators of this relationship, b) developing appropriate methodologies to study these effects, and c) creating new interventions.

Moderators

Gender. Gender is a common moderator in the health literature, but its role as a moderator of

perceived discrimination effects is not entirely clear. In terms of general reactions to perceived discrimination, there does not appear to be a consistent pattern of sex differences (Merluzzi et al., 2015). Regarding substance use, the fact that males tend to use more than females in adolescence has been established, and that pattern can be seen in the discrimination literature (Brody, Kogan & Chen, 2012). But that difference appears to be diminishing (Keyes et al., 2015), and may even be reversing (Lorenzo-Blanco et al., 2011). In FACHS, perceived racial discrimination is strongly associated with smoking for both genders, but there is more smoking in Iowa among the women than the men. Finally, as mentioned, women appear to be more likely to respond in a more positive (healthy) manner to perceived discrimination in terms of exercise and nutrition (Brodish et al., 2011); but very few studies have looked at this important question. More effort is needed to examine gender differences—both empirically and through systematic reviews of the literature. This research needs to maintain a focus on the central topic—perceived racial discrimination—to determine whether there are meaningful gender differences in reactions to discrimination or whether what appears as male–female variance in reactions to discrimination is actually a difference between the two sexes in health behavior (risky sex, substance use), health outcomes (disease vulnerability or problems in use), or stress reactivity that may be gender-based but has little to do with race (i.e., other racial/ethnic groups would respond the same way).

Genomics. Some of the most influential work in the genomics area has been done by psychologists examining genetic moderation of stressors, including interpersonal stressors (Caspi & Moffitt, 2006). In this regard, we agree with others (e.g., Williams et al., 2010) that there is a need for similar research that examines the extent to which genetic architecture moderates reactions to perceived racial discrimination and other types of stress, not just among African Americans, but among all racial/ethnic groups. The focus here should be on response commonalities among different groups, rather than racial/ethnic differences (in genetic structure, for example), because these commonalities are most likely to produce information that can address the question of why individuals respond the way they do

to difficult (but not unique) situations, and what can be done to prepare them for stress and facilitate coping. One subarea with considerable potential is that of *epigenetics*—the study of factors that modify gene expression and therefore behavior, without altering basic genetic structure (Umesh, Kness, Simlai & Bose, 2015). There is increasing evidence that substance use can alter gene expression (Philibert et al., 2015); the same *may* be true for stress (Heim & Binder, 2012), such as that produced by racial discrimination, but we don't know. One focus of future research, then, would be the extent to which both racial discrimination and the substance use/abuse it can promote produce epigenetic changes that may alter the behavior and health of multiple generations. Finally, encouraging work by Brody, Beach and their colleagues has indicated that information about genetic architecture can be used effectively in the development and implementation of interventions aimed at reducing the relation between perceived discrimination and unhealthy behavior (e.g., Brody, Beach, Philibert, Chen, & Murry, 2009).

Age. As the US population ages, interest in, and need for, research that looks at the long-term impact of discrimination is going to increase; the same is true for efforts aimed at identifying coping responses that are associated with longevity and well-being in minority populations. Along similar lines, very few studies to date have taken a developmental perspective—e.g., how do reactions to perceived discrimination vary across the lifespan? As is common in the health literature, most of the extant research has focused on the negative—examining problems associated with discrimination. More attention needs to be paid to the basic issue of *resilience*—how and why do most Blacks and other minorities manage to overcome the difficulties associated with perceived discrimination and other types of stress and do well in spite of these difficulties? This kind of research would also benefit from some focus on trajectories of perceived discrimination among Blacks as they grow old. A related topic, mentioned earlier, is the extent to which perceived racial discrimination (especially chronic) increases vulnerability to other stressors (e.g., economic; or health, such as aging or cancer; Merluzzi et al. 2015).

Social exclusion vs. discrimination. The Cyberball paradigm has proven to be an effective means of manipulating discrimination, but it also raises the question of whether discrimination and social exclusion have similar health effects. Is it social exclusion when the “players” are the same race and gender as the participant, and discrimination when they are different? Or does it matter? Stock and colleagues have been examining this issue. Molloy et al. (2016) for example, assessed Black and White young adults’ perceived racial discrimination and perceived exclusion by members of their own vs. the other race—in essence, comparing social exclusion with discrimination. The Black subsample’s responses indicated a stronger link between *other-race* exclusion and risky sexual behavior. Among Whites, however, willingness to use substances was higher when being excluded by members of *their own* race (Stock, Gibbons & Beekman, 2016). Along the same lines, there is some evidence that perceived racial discrimination is increasing among Whites (Norton & Sommers, 2011), which raises the possibility of a link between perceived racial discrimination and health problems for the majority group. These are all important questions with intervention implications that should be investigated.

Methodology

Effective paradigms exist for examining perceived racial discrimination and various health behaviors (good and bad) in the lab. Racial discrimination manipulations include simple interracial interactions (Richeson & Shelton, 2007), as well as the Cyberball paradigm, which appears to be very effective. Drug use and risky sex are difficult to study in the lab, of course, but the literature suggests self-reports of these behaviors are valid. In addition to self-report, alcohol use can be assessed effectively through *in situ* observation, e.g., “bar labs” (Bartholow, Henry, Lust, Saults, & Wood, 2012). Eating behavior can also be examined in the lab. Effective measures of affective response that can supplement self-reports are available and should be utilized. Masten, Telzer and Eisenberger (2011), for example, used fMRI to examine perceived racial discrimination effects. Finally, prevention science is increasingly emphasizing the incorporation of technological advances into its methodology. That is likely to be the case for the

study of perceived racial discrimination and interventions related to it. This would include use of social media, but also advanced data collection strategies, such as ecological momentary assessment (Brondolo et al., 2015).

Interventions

For both pragmatic and scientific reasons, it is highly likely that future research in this area will have some focus on, or implications for, intervention and/or prevention. Grant funding decisions are increasingly reflecting an emphasis on tangible results, often defined as evidence of meaningful behavior change, or at least studies that can inform development of effective education and intervention programs. From an ethical standpoint, it may be difficult to justify focusing efforts to reduce the harsh effects of perceived racial discrimination on the victims of that discrimination rather than the perpetrators of it. However, from a practical standpoint, we believe there is likely to be more success, sooner, if this path is pursued. Two areas appear to us to be logical targets for this effort, both suggested by previous research identifying significant moderators of reactions to racial discrimination.

Parenting. Programs designed to increase *parenting effectiveness* can mitigate the negative affective response to perceived racial discrimination that some Black adolescents display (Berkel et al., 2009). Related to this, we need to know more about what types of *racial socialization* can effectively prepare Black adolescents for the difficulties many of them will encounter in their interactions with the White majority. A critical issue appears to be examining the efficacy of socialization efforts that include warning children about the future and/or encouraging vigilance (e.g., mistrust). The literature is mixed on this point (see Stock et al., 2016); clarification is needed.

Racial identity. Evidence is emerging from both survey and lab studies of the efficacy of racial/ethnic identity as a buffer against the stress associated with racial discrimination. Along these lines, several interventions and preventive interventions have been developed that are based in some way on racial/ethnic identity, and have been shown to effectively slow the escalation of substance use that is

normative in adolescence. The Strong African American Families Program (SAAF; Brody et al., 2010; Gerrard et al., 2006) is a good example. The intervention was developed based, in part, on a social norms perspective. The idea was that educating Black adolescents to the fact that Black adolescents don't use substances as much as White adolescents can enhance racial identity and use it as a counter to social pressures toward substance use, and also to the pressure that comes from the stress associated with perceived discrimination.

Conclusion

Both lab and survey studies have shown that perceived racial discrimination has a major impact on health behavior and health status. That impact appears to be somewhat more pronounced for discrimination based on race than other types of discrimination, and it appears to be stronger for Blacks than other racial/ethnic groups. The effects of racial discrimination on health status can be direct, such as its impact on increased C-reactive protein or cardiovascular reactivity (these direct effects may also be mediated--by affective responses); or it can work indirectly through unhealthy behaviors, such as risky sex or substance use. Certain factors have been shown to enhance perceived racial discrimination effects, such as low self-control, relationship instability, and certain racial socialization styles. But a number of factors have been identified that are associated with reduced discrimination effects--genomics or coping style, for example. Importantly, some of those buffers can be, and have been, modified in interventions, parenting and racial/ethnic identity being prime examples. Changing norms and associated attitudes in a society as complex as the US is a very difficult process that takes a long time; nonetheless, progress has been made, at least in terms of reducing the short term effects that perceived racial discrimination can have on health. Whether that is also true for the long-term effects of chronic exposure to racial discrimination remains to be seen. Psychologists have the means to address this issue. Efforts in this direction are definitely needed—we encourage those efforts.

References

- Aklin, W. M., Moolchan, E. T., Luckenbaugh, D. A., & Ernst, M. (2009). Early tobacco smoking in adolescents with externalizing disorders: Inferences for reward function. *Nicotine and Tobacco Research, 11*(6), 750-755.
- Bachman, J. G., O'Malley, P. M., Johnston, L. D., Schulenberg, J. E., & Wallace Jr, J. M. (2011). Racial/Ethnic Differences in the Relationship between Parental Education and Substance Use Among US 8th-, 10th-, and 12th-Grade Students: Findings from the Monitoring the Future Project. *Journal of Studies on Alcohol and Drugs, 72*(2), 279-285.
- Bartholow, B. D., Henry, E. A., Lust, S. A., Sauls, J. S., & Wood, P. K. (2012). Alcohol effects on performance monitoring and adjustment: Affect modulation and impairment of evaluative cognitive control. *Journal of Abnormal Psychology, 121*(1), 173-186.
- Belsky, J., & Pluess, M. (2009). The nature (and nurture?) of plasticity in early human development. *Perspectives on Psychological Science, 4*(4), 345-351.
- Berkel, C., Murry, V. M., Hurt, T. R., Chen, Y., Brody, G. H., & Gibbons, F. X. (2009). It takes a village: Protecting rural African American youth in the context of racism. *Journal of Youth and Adolescence, 38*(2), 175-188.
- Bogart, L. M., Landrine, H., Galvan, F. H., Wagner, G. J., & Klein, D. J. (2013). Perceived discrimination and physical health among HIV-positive Black and Hispanic men who have sex with men. *AIDS and Behavior, 17*(4), 1431-1441.
- Borrell, L. N., Kiefe, C., Diez-Roux, A. V., Williams, D., & Gordon-Larsen, P. (2013). Racial discrimination, racial/ethnic segregation and health behaviors in the CARDIA study. *Ethnicity & Health, 18*, 227-243.
- Bowleg, L., Burkholder, G. J., Massie, J. S., & ... Tschann, J. M. (2013). Racial discrimination, social support, and sexual HIV risk among Black heterosexual men. *AIDS and Behavior, 17*(1), 407-418.

- Brodish, A. B., Cogburn, C. D., Fuller-Rowell, T. E., Peck, S., Malanchuk, O., & Eccles, J.S. (2011). Perceived racial discrimination as a predictor of health behaviors: The moderating role of gender. *Race and Social Problems, 3*(3), 160-169.
- Brody, G. H., Murry, V. M., Gerrard, M., & ... Neubaum-Carlan, E. (2004). The strong African American families program: Translating research into prevention programming. *Child Development, 75*, 900-917.
- Brody, G. H., Beach, S. R. H., Philibert, R. A., Chen, Y., & Murry, V. M. (2009). Prevention effects moderate the association of 5-HTTLPR and youth risk behavior initiation: Gene × environment hypotheses tested via a randomized prevention design. *Child Development, 80*(3), 645-661.
- Brody, G. H., Chen, Y., Kogan, S. M., Murry, V. M., & Brown, A. C. (2010). Long-term effects of the Strong African American Families program on youths' alcohol use. *Journal of Consulting and Clinical Psychology, 78*(2), 281-285.
- Brody, G. H., Beach, S. R. H., Chen, Y., & ... R. L. (2011). Perceived discrimination, serotonin transporter linked polymorphic region status, and the development of conduct problems. *Development and Psychopathology, 23*(2), 617-627.
- Brody, G. H., Kogan, S. M., & Chen, Y. (2012a). Perceived discrimination and longitudinal increases in adolescent substance use: Gender differences and mediational pathways. *American Journal of Public Health, 102*(5), 1006-1011.
- Brody, G. H., Chen, Y., & Beach, S. R. H. (2013). Differential susceptibility to prevention: GABAergic, dopaminergic, and multilocus effects. *Journal of Child Psychology and Psychiatry and Allied Disciplines, 54*(8), 863-871.
- Brondolo, E., Monge, A., Agosta, J., & ... Schwartz, J. (2015). Perceived ethnic discrimination and cigarette smoking: examining the moderating effects of race/ethnicity and gender in a sample of Black and Latino urban adults. *Journal of Behavioral Medicine, 38*(4), 689-700.

- Burrow, A. L., & Ong, A. D. (2010). Racial identity as a moderator of daily exposure and reactivity to racial discrimination. *Self and Identity, 9*(4), 383-402.
- Burt, C.H., Simons, R., & Gibbons, F.X. (2012). Racial discrimination, ethnic-racial socialization, and crime: A micro-sociological model of risk and resilience. *American Sociological Review, 77*(4), 648-677.
- Caetano, R., & Clark, C. L. (1998). Trends in alcohol-related problems among Whites, Blacks and Hispanics: 1984–1995. *Alcoholism: Clinical and Experimental Research, 22*(2), 534-538.
- Caldwell, C. H., Wright, J. C., Zimmerman, M. A., & ... Isichei, P. A. (2004). Enhancing adolescent health behaviors through strengthening non-resident father–son relationships: a model for intervention with African-American families. *Health Education Research, 19*(6), 644-656.
- Carver, C. S. (1997). You want to measure coping but your protocol's too long: Consider the brief cope. *International Journal of Behavioral Medicine, 4*(1), 92-100.
- Casagrande, S. S., Gary, T. L., LaVeist, T. A., Gaskin, D. J., & Cooper, L. A. (2007). Perceived discrimination and adherence to medical care in a racially integrated community. *Journal of General Internal Medicine, 22*(3), 389-395.
- Caspi, A., & Moffitt, T. E. (2006). Gene–environment interactions in psychiatry: joining forces with neuroscience. *Nature Reviews Neuroscience, 7*(7), 583-590.
- Chae, D. H., Nuru-Jeter, A. M., Adler, N. , & ... Epel, E.S. (2014). Discrimination, racial bias, and telomere length in African-American men. *American Journal of Preventive Medicine, 46*(2), 103-111.
- Chen, D., & Yang, T. (2014). The pathways from perceived discrimination to self-rated health: An investigation of the roles of distrust, social capital, and health behaviors. *Social Science & Medicine, 104*, 64-73.
- Chen, P., & Jacobson, K.C. (2012). Developmental trajectories of substance use from early adolescence to young adulthood: Gender and racial/ethnic differences. *Journal of Adolescent Health, 50*(2), 154-163.

- Choi, Y., Harachi, T. W., Gillmore, M. R., & Catalano, R. F. (2006). Are multiracial adolescents at greater risk? Comparisons of rates, patterns, and correlates of substance use and violence between monoracial and multiracial adolescents. *American Journal of Orthopsychiatry*, *76*(1), 86-97.
- Chou, T., Asnaani, A., & Hofmann, S. G. (2012). Perception of racial discrimination and psychopathology across three U.S. ethnic minority groups. *Cultural Diversity & Ethnic Minority Psychology*, *18*, 74-81.
- Clark, T. T. (2014). Perceived discrimination, depressive symptoms, and substance use in young adulthood. *Addictive Behaviors*, *39*(6), 1021-1025.
- Clarke, J. G., Martin, R. A., Stein, L., & ... Bock, B. (2011). Working inside for smoking elimination (project W.I.S.E.) study design and rationale to prevent return to smoking after release from a smoke free prison. *BMC Public Health*, *11*, 767-772.
- Conner, B. T., Helleman, G. S., Ritchie, T. L., & Noble, E. (2010). Genetic, personality, and environmental predictors of drug use in adolescents. *Journal of Substance Abuse Treatment*, *38*(2), 178-190.
- Corral, I., & Landrine, H. (2012). Racial discrimination and health-promoting vs damaging behaviors among African-American adults. *Journal of Health Psychology*, *17*(8), 1176-1182.
- Crawley, L. M., Ahn, D. K., & Winkleby, M. A. (2008). Perceived medical discrimination and cancer screening behaviors of racial and ethnic minority adults. *Cancer Epidemiology Biomarkers and Prevention*, *17*(8), 1937-1944.
- Curry, L. A., & Youngblade, L. M. (2006). Negative affect, risk perception, and adolescent risk behavior. *Journal of Applied Developmental Psychology*, *27*(5), 468-485.
- Cuevas, A. G., Reitzel, L. R., Adams, & ... McNeill, L. H. (2014). Discrimination, affect, and cancer risk factors among African Americans. *American Journal of Health Behavior*, *38*(1), 31-41.

- Danese, A., Pariante, C. M., Caspi, A., Taylor, A., & Poulton, R. (2007). Childhood maltreatment predicts adult inflammation in a life-course study. *Proceedings of the National Academy of Sciences of the United States of America*, *104*(4), 1319-1324.
- DeSantis, C., Naishadham, D., & Jemal, A. (2013). Cancer statistics for African Americans. *CA: A Cancer Journal for Clinicians*, *63*, 151-66.
- Dick, D. M., Agrawal, A., Keller, M. C., & ... Sher, K. J. (2015). Candidate Gene–Environment interaction research: Reflections and recommendations. *Perspectives on Psychological Science*, *10*(1), 37-59.
- Ding, K., & Crawley, M. B. (2010). Drug use among African American teenagers and their mental health. *Home Health Care Management and Practice*, *22*(7), 492-498.
- Doane, L.D. & Zeiders, K.H. (2014). Contextual moderators of momentary cortisol and negative affect on adolescents' daily lives. *Journal of Adolescent Health*, 536-542.
- Faseru, B., Choi, W. S., Krebill, R., & ... Cox, L. S. (2011). Factors associated with smoking menthol cigarettes among treatment-seeking African American light smokers. *Addictive Behaviors*, *36*(12), 1321-1324.
- Fernandez, S., Tobin, J. N., Cassells, A., Diaz-Gloster, M., Kalida, C., & Ogedegbe, G. (2011). The counseling African Americans to control hypertension (CAATCH) trial: baseline demographic, clinical, psychosocial, and behavioral characteristics. *Implementation Science*, *6*, 100-112.
- Finlay, A. K., White, H. R., Mun, E., Cronley, C. C., & Lee, C. (2012). Racial differences in trajectories of heavy drinking and regular marijuana use from ages 13 to 24 among African-American and White males. *Drug and Alcohol Dependence*, *121*(1), 118-123.
- Forsyth, J. M., Schoenthaler, A., Ogedegbe, G., & Ravenell, J. (2014). Perceived racial discrimination and adoption of health behaviors in hypertensive Black Americans: The CAATCH trial. *Journal of Health Care for the Poor and Underserved*, *25*(1), 276-291.

- Gerrard, M., Gibbons, F. X., Brody, G. H., Murry, V. M., Cleveland, M. J., & Wills, T. A. (2006). A theory-based dual-focus alcohol intervention for preadolescents: The strong African American families program. *Psychology of Addictive Behaviors, 20*(2), 185-195.
- Gerrard, M., Gibbons, F. X., Houlihan, A., Stock, M.L., & Pomery, E.A. (2008). A dual-process approach to health risk decision making: The prototype willingness model. *Developmental Review, 28*, 29-61.
- Gerrard, M., Stock, M. L., Roberts, M. E., Gibbons, F.X., O’Hara, R.E., Weng, C-Y., & Wills, T. A. (2012). Coping with racial discrimination: The role of substance use. *Psychology of Addictive Behaviors, 26*(3), 550-560.
- Geronimus, A.T., Hicken, M., Keene, D., & Bound, J. (2006). “Weathering” and Age Patterns of Allostatic Load Scores among Blacks and Whites in the US. *American Journal of Public Health, 96*, 826–833.
- Gibbons, F.X., Abraham, W.T., Gerrard, M., Stock, M.L., Beach, S.R., Wills, T.A. ... & Cutrona, C.E. (2016a). *Racial Sensitivity: Genetic Architecture Moderates Reactions to Perceived Racial Discrimination among African Americans*. Manuscript under review.
- Gibbons, F.X., Etcheverry, P.E., Stock, M.L., Gerrard, M., Weng, C.-Y., Kiviniemi, M., & O’Hara, R.E. (2010b). Exploring the link between racial discrimination and substance use. What mediates? What buffers? *Journal of Personality and Social Psychology, 99*(5),785-801.
- Gibbons, F.X., Gerrard, M., Cleveland, M.J., Wills, T.A., & Brody, G.H. (2004). Perceived discrimination and substance use in African American parents and their children: A panel study. *Journal of Personality and Social Psychology, 86*, 517-529.
- Gibbons, F.X., Gerrard, M., Stock, M.L., & Finneran, S. (2015). The Prototype/Willingness Model. In M. Connor & P. Norman (Eds.), *Predicting and Changing Health Behaviour: Research and Practice with Social Cognition Models* (3rd Ed.) (pp. 189-224), Cambridge, UK: Cambridge Univ. Press.
- Gibbons, F.X., Kingsbury, J.H., & Gerrard, M. (2016b). *The salutary effects of racism: Exercise, eating and racial discrimination in Black women*. Manuscript in progress.

- Gibbons, F.X., Kingsbury, J.H., Weng, C.-Y., Gerrard, M., Cutrona, C.E., Wills, T.A., & Stock, M.L. (2014). Effects of perceived racial discrimination on health status and health behavior: A differential mediation hypothesis. *Health Psychology, 33*, 11-19.
- Gibbons, F.X., O'Hara, R.E., Stock, M.L., Gerrard, M., Weng, C-Y., Wills, T.A. (2012a). The erosive effects of racism: Reduced self-control mediates the relation between perceived racial discrimination and substance use in African American adolescents. *Journal of Personality and Social Psychology, 102*, 1089-1104.
- Gibbons, F.X., Pomery, E.A., Gerrard, M., Sargent, J.D., Weng, C-Y., Wills, T.A. ... & Yeh, H-C. (2010a). Media as social influence: Racial differences in the effects of peers and media on adolescent alcohol cognitions and consumption. *Psychology of Addictive Behaviors, 24*, 649-659.
- Gibbons, F.X., Roberts, M.E., Gerrard, M., Li, Z., Beach, S.R., Simons, R.... & Philibert, R.A. (2012b). The impact of stress on the life history strategies of African American adolescents: Cognitions, genetic moderation, and the role of discrimination. *Developmental Psychology, 48*, 722-739.
- Gibbons, F.X., Yeh, H., Gerrard, M., Cleveland, M.J., Cutrona, C.E., Simons, R.L. ... & Brody, G.H. (2007). Early experience with discrimination and conduct disorder as predictors of subsequent drug use: A critical period analysis. *Drug and Alcohol Dependence, 88*, 27-37.
- Goodin, B.R., & Bulls, H.W. (2013). Optimism and the experience of pain: benefits of seeing the glass as half full. *Current Pain and Headache Reports, 17*(5), 1-9.
- Goodwin, S. A., Williams, K. D., & Carter-Sowell, A. R. (2010). The psychological sting of stigma: The costs of attributing ostracism to racism. *Journal of Experimental Social Psychology, 46*(4), 612-618.
- Goosby, B. J., Malone, S., Richardson, E. A., Cheadle, J. E., & Williams, D. T. (2015). Perceived discrimination and markers of cardiovascular risk among low-income African American youth. *American Journal of Human Biology, 27*(4), 546-552.
- Gray, C. M., & Montgomery, M. J. (2012). Links between alcohol and other drug problems and

- maltreatment among adolescent girls: Perceived discrimination, ethnic identity, and ethnic orientation as moderators. *Child Abuse & Neglect*, 36(5), 449-460.
- Griffin, R., Dunwoody, S., & Yang, Z. (2012). Linking risk messages to information seeking and processing. In C.T. Salmon (Ed.), *Communication Yearbook 36* (pp. 323-362). NY: Taylor & Francis.
- Guthrie, B. J., Young, A. M., Williams, D., Boyd, C., & Kintner, E. K. (2002). African American girls' smoking habits and day-to-day experiences with racial discrimination. *Nursing Research*, 51(3), 183-190.
- Guyll, M., Matthews, K. A., & Bromberger, J. T. (2001). Discrimination and unfair treatment: Relationship to cardiovascular reactivity among African American and European American women. *Health Psychology*, 20(5), 315-325.
- Hansen, K. (2015). Ethnic discrimination and health: the relationship between experienced ethnic discrimination and multiple health domains in Norway's rural Sami population. *International Journal of Circumpolar Health*, 74.
- Heim, C., & Binder, E.B. (2012). Current research trends in early life stress and depression: Review of human studies on sensitive periods, gene-environment interactions, and epigenetics. *Experimental Neurology*, 233, 102-111.
- Hockey, G. R. J., Maule, A. J., Clough, P. J., & Bdzola, L. (2000). Effects of negative mood states on risk in everyday decision making. *Cognition and Emotion*, 14(6), 823-856.
- Holahan, C. J., Pahl, S. A., Cronkite, R. C., Holahan, C. K., North, R. J., & Moos, R. H. (2010). Depression and vulnerability to incident physical illness across 10 years. *Journal of Affective Disorders*, 123, 222-229.
- Horton, K. D., & Loukas, A. (2013). Discrimination, religious coping, and tobacco use among White, African American, and Mexican American vocational school students. *Journal of Religion and Health*, 52(1), 169-183.

- Houlihan, A. E., Gibbons, F. X., Gerrard, M., & ... Murry, V. M. (2008). Sex and the self the impact of early sexual onset on the self-concept and subsequent risky behavior of African American adolescents. *The Journal of Early Adolescence*, 28(1), 70-91.
- Howlader, N., Noone, A.M., Krapcho, M., & ... Cronin, K.A. (eds). *SEER Cancer Statistics Review, 1975-2012* [Database]. National Cancer Institute. Bethesda, MD.
- Kandel, D., Schaffran, C., Hu, M. C., & Thomas, Y. (2011). Age-related differences in cigarette smoking among whites and African-Americans: evidence for the crossover hypothesis. *Drug and alcohol dependence*, 118(2), 280-287
- Keyes, K. M., Vo, T., Wall, M.M., & .. Hasin, D. (2015). Racial/ethnic differences in use of alcohol, tobacco, and marijuana: Is there a cross-over from adolescence to adulthood? *Social Science and Medicine*, 124, 132-141.
- Klein, W. P., Shepperd, J. A., Suls, J., Rothman, A. J., & Croyle, R. T. (2015). Realizing the promise of social psychology in improving public health. *Personality and Social Psychology Review*, 19(1), 77-92.
- Kogan, S. M., Yu, T., Allen, K. A., Pocock, A. M., & Brody, G. H. (2015). Pathways from racial discrimination to multiple sexual partners among male African American adolescents. *Psychology of Men & Masculinity*, 16(2), 218-228.
- Krieger, N., & Sidney, S. (1996). Racial discrimination and blood pressure: The CARDIA study of young Black and white adults. *American Journal of Public Health*, 86(10), 1370-1378.
- Krieger, N., Smith, K., Naishadham, D., Hartman, C., & Barbeau, E.M. (2005). Experiences of discrimination: Validity and reliability of a self-report measure for population health research on racism and health. *Social Science & Medicine*, 61(7), 1576-1596.
- Landrine, H., & Klonoff, E. A. (1996). The schedule of racist events: A measure of racial discrimination and a study of its negative physical and mental health consequences. *Journal of Black Psychology*, 22(2), 144-168.

- Larson, J. & Lochman, J.E. (2010). *Helping Schoolchildren Cope with Anger: A cognitive behavioral intervention*. New York, NY: Guilford Press.
- Latzman, R. D., Chan, W. Y., & Shishido, Y. (2013). Impulsivity moderates the association between racial discrimination and alcohol problems. *Addictive Behaviors, 38*(12), 2898-2904.
- Leonard, K. E., & Homish, G. G. (2005). Changes in marijuana use over the transition into marriage. *Journal of Drug Issues, 35*(2), 409-429.
- Lerner, J.S., & Keltner, D. (2001). Fear, anger, and risk. *Journal of Personality and Social Psychology, 81*, 146-159.
- Lewis, T. T., Aiello, A. E., Leurgans, S., Kelly, J., & Barnes, L. L. (2010). Self-reported experiences of everyday discrimination are associated with elevated C-reactive protein levels in older African-American adults. *Brain, Behavior, And Immunity, 24*(3), 438-443.
- Lincoln, K. D., Abdou, C. M., & Lloyd, D. (2014). Race and socioeconomic differences in obesity and depression among Black and non-Hispanic White Americans. *Journal of Health Care for the Poor and Underserved, 25*(1), 257-275.
- Mason, M. J., Mennis, J., Linker, J., Bares, C., & Zaharakis, N. (2014). Peer attitudes effects on adolescent substance use: The moderating role of race and gender. *Prevention Science: The Official Journal of the Society for Prevention Research, 15*(1), 56-64.
- Masten, C. L., Telzer, E. H., & Eisenberger, N. I. (2011). An fMRI investigation of attributing negative social treatment to racial discrimination. *Journal of Cognitive Neuroscience, 23*(5), 1042-1051.
- Marshal, M. P., Friedman, M. S., Stall, R., & ... Morse, J. Q. (2008). Sexual orientation and adolescent substance use: a meta-analysis and methodological review. *Addiction, 103*(4), 546-556.
- McCabe, S. E., Bostwick, W. B., Hughes, T. L., West, B. T., & Boyd, C. J. (2010). The relationship between discrimination and substance use disorders among lesbian, gay, and bisexual adults in the United States. *American Journal of Public Health, 100*(10), 1946-1952.

- McDonald, J. A., Terry, M. B., & Tehranifar, P. (2014). Racial and gender discrimination, early life factors, and chronic physical health conditions in midlife. *Women's Health Issues, 24*(1), e53-e59.
- Merluzzi, T. V., Philip, E. J., Zhang, Z., & Sullivan, C. (2015). Perceived discrimination, coping, and quality of life for African-American and Caucasian persons with cancer. *Cultural Diversity and Ethnic Minority Psychology, 337-344*.
- Minior, T., Galea, S., Stuber, J., Ahern, J., & Ompad, D. (2003). Racial differences in discrimination experiences and responses among minority substance users. *Ethnicity and Disease, 13*, 521-527.
- Molloy, B.K., Stock, M. L., & Gibbons, F.X. (2016). *The effects of perceived discrimination on self-control, future time perspective, and HIV-risk behaviors among Black and White young adults*. Manuscript in preparation.
- Moons, W. G., & MacKie, D. M. (2007). Thinking straight while seeing red: The influence of anger on information processing. *Personality and Social Psychology Bulletin, 33*(5), 706-720.
- Muraven, M. (2010). Building self-control strength: Practicing self-control leads to improved self-control performance. *Journal of Experimental Social Psychology, 46*(2), 465-468.
- Norton, M. I., & Sommers, S. R. (2011). Whites see racism as a zero-sum game that they are now losing. *Perspectives on Psychological Science, 6*(3), 215-218.
- Pascoe, E. A., & Richman, L. S. (2009). Perceived discrimination and health: A meta-analytic review. *Psychological Bulletin, 135*(4), 531-554.
- Paul, J. P., Boylan, R., Gregorich, S., Ayala, G., & Choi, K. (2014). Substance use and experienced stigmatization among ethnic minority men who have sex with men in the United States. *Journal of Ethnicity in Substance Abuse, 13*(4), 430-447.
- Peterson, L., Stock, M.L, & Zucker, A. (2014). *The independent contribution of racial discrimination to African American women's depression and sexual behavior: Investigating intersectional gender and racial discrimination*. Poster presented at Society for Personality and Social Psychology.

- Philibert, R.A., Hollenbeck, N., Andersen, E., & ... Wang, K.A (2015). A quantitative epigenetic approach for the assessment of cigarette consumption. *Frontiers in Psychology, 6*, 1-8.
- Phinney, J. S. (1992). The multigroup ethnic identity measure a new scale for use with diverse groups. *Journal of Adolescent Research, 7*(2), 156-176.
- Pittman, C. T. (2011). Getting mad but ending up sad: The mental health consequences for African Americans using anger to cope with racism. *Journal of Black Studies, 42*(7), 1106-1124.
- Pomery, E. A., Gibbons, F. X., Reis-Bergan, M., & Gerrard, M. (2009). From willingness to intention: Experience moderates the shift from reactive to reasoned behavior. *Personality and Social Psychology Bulletin, 35*(7), 894-908.
- Pugh, L. A., & Bry, B. H. (2007). The protective effects of ethnic identity for alcohol and marijuana use among Black young adults. *Cultural Diversity and Ethnic Minority Psychology, 13*(2), 187-193.
- Reed, E., Santana, M. C., Bowleg, L., Welles, S. L., Horsburgh, C. R., & Raj, A. (2013). Experiences of racial discrimination and relation to sexual risk for HIV among a sample of urban Black and African American men. *Journal of Urban Health, 90*(2), 314-322.
- Richeson, J. A., & Shelton, J.N. (2007). Negotiating interracial interactions: Cost, consequences, and possibilities. *Current Directions in Psychological Science, 16*, 316-320.
- Roberts, M. E., Gibbons, F. X., Gerrard, M., & ... Lorenz, F. O. (2012). From racial discrimination to risky sex: Prospective relations involving peers and parents. *Developmental Psychology, 48*, 89-102.
- Rodriguez, D., Carlos, H. A., Adachi-Mejia, A. M., Berke, E. M., & Sargent, J. D. (2013). Predictors of tobacco outlet density nationwide: A geographic analysis. *Tobacco Control, 22*(5), 349-355.
- Rote, S. M., & Taylor, J. (2014). Black/White differences in adolescent drug use: A test of six hypotheses. *Journal of Child and Adolescent Substance Abuse, 23*(5), 282-290.
- Ryan, A. M., Gee, G. C., & Laflamme, D. F. (2006). The association between self-reported discrimination, physical health and blood pressure: Findings from African Americans, Black immigrants, and

- Latino immigrants in New Hampshire. *Journal of Health Care for the Poor and Underserved*, 17(2), 116-132.
- Rydell, R. J., MacKie, D. M., Maitner, A. T., Claypool, H. M., Ryan, M. J., & Smith, E. R. (2008). Arousal, processing, and risk taking: Consequences of intergroup anger. *Personality and Social Psychology Bulletin*, 34(8), 1141-1152.
- Sanders-Phillips, K., Kliewer, W., Tirmazi, T., Nebbitt, V., Carter, T., & Key, H. (2014). Perceived racial discrimination, drug use, and psychological distress in African American youth: A pathway to child health disparities. *Journal of Social Issues*, 70(2), 279-297.
- Sellers, R. M., & Shelton, J. N. (2003). The role of racial identity in perceived racial discrimination. *Journal of Personality and Social Psychology*, 84(5), 1079-1092.
- Scott Jr., L. D., & House, L. E. (2005). Relationship of distress and perceived control to coping with perceived racial discrimination among Black youth. *Journal of Black Psychology*, 31(3), 254-272.
- Simons, R. L., Simons, L. G., Burt, C. H., & ... Cutrona, C. (2006). Supportive parenting moderates the effect of discrimination upon anger, hostile view of relationships, and violence among African American boys. *Journal of Health and Social Behavior*, 47(4), 373-389.
- Slopen, N., Lewis, T. T., & Williams, D. R. (2016). Discrimination and sleep: A systematic review. *Sleep Medicine*, 18, 88-95.
- Spoth, R., Trudeau, L., Shin, C., & ... Feinberg, M. (2013). Longitudinal effects of universal preventive intervention on prescription drug misuse: Three randomized controlled trials with late adolescents and young adults. *American Journal of Public Health*, 103(4), 665-672.
- Stock, M.L., Beekman, J.B., & Gibbons, F.X. (2016). Impact of racial discrimination on sexual and substance use behaviors among African Americans adolescents: Which racial socialization components are protective for males versus females? *Manuscript in preparation*.

- Stock, M.L. & Gibbons, F.X. (2016). *Racial discrimination and HIV-risk cognitions: Mediating and moderating mechanisms*. Manuscript in preparation.
- Stock, M.L., Gibbons, F.X., & Beekman, J.B. (2015). Social exclusion and substance use cognitions and behaviors. In C. Kopetz & C. Lejuez (Eds.), *Frontiers in Social Psychology: Addiction* (pp. 76-97). New York, NY: Routledge.
- Stock, M. L., Gibbons, F. X., Peterson, L. M., & Gerrard, M. (2013). The effects of racial discrimination on the HIV-risk cognitions and behaviors of black adolescents and young adults. *Health Psychology, 32*(5), 543-550.
- Stock, M. L., Gibbons, F. X., Walsh, L. A., & Gerrard, M. (2011). Racial identification, racial discrimination, and substance use vulnerability among African American young adults. *Personality and Social Psychology Bulletin, 37*(10), 1349-1361.
- Sutin, A. R., English, D., Evans, M. K., & Zonderman, A. B. (2014). Perceived sex discrimination amplifies the effect of antagonism on cigarette smoking. *Nicotine & Tobacco Research, 16*(6), 794-799.
- Tangney, J. P., Baumeister, R. F., & Boone, A. L. (2004). High self-control predicts good adjustment, less pathology, better grades, and interpersonal success. *Journal of Personality, 72*(2), 271-324.
- Terrell F., Miller A.R., Foster K., & Watkins C.E. Jr. (2006). Racial discrimination-induced anger and alcohol use among Black adolescents. *Adolescence, 41*(163), 485-492.
- Thoma, B. C., & Huebner, D. M. (2013). Health consequences of racist and antigay discrimination for multiple minority adolescents. *Cultural Diversity and Ethnic Minority Psychology, 19*(4), 404-413.
- Thorburn, S., Faith, J., Keon, K. L., & Tippens, K. M. (2013). Discrimination in health care and CAM use in a representative sample of U.S. adults. *Journal of Alternative and Complementary Medicine, 19*(6), 577-581.
- Tucker, J. S., Ellickson, P. L., Orlando, M., Martino, S. C., & Klein, D. J. (2005). Substance use trajectories from early adolescence to emerging adulthood: A comparison of smoking, binge drinking, and

- marijuana use. *Journal of Drug Issues*, 35(2), 307-331.
- US Department of Labor, Bureau of Labor Statistics. (2016). *Employment status of the civilian population by race, sex, and age*. Retrieved from <http://www.bls.gov/news.release/empsit.t02.htm>
- U.S. Food and Drug Administration (2013). *Preliminary scientific evaluation of the possible public health effects of menthol versus nonmenthol cigarettes*. www.fda.gov/downloads/UCM361598.pdf
- Umesh, S., Khes, C. R. J., Simlai, J., & Bose, S. (2015). The role of epigenetic mechanisms in substance use disorders: An overview. *Hereditary Genetics* 4: 149.
- Unger, J. B., Schwartz, S. J., Huh, J., Soto, D. W., & Baezconde-Garbanati, L. (2014). Acculturation and perceived discrimination: Predictors of substance use trajectories from adolescence to emerging adulthood among Hispanics. *Addictive Behaviors*, 39(9), 1293-1296.
- Watson, D., & Clark, L. A. (1984). Negative affectivity: the disposition to experience aversive emotional states. *Psychological Bulletin*, 96(3), 465-490.
- West, H.C., Sabol, W.J., & Greenman, S.J. (2010). *Prisoners in 2009*. (NCJ231675). Washington, DC: U.S. Department of Justice, Bureau of Justice Statistics.
- Wetter, D. W., Cofta-Gunn, L., Irvin, J. E., & ... Gritz, E. R. (2005). What accounts for the association of education and smoking cessation? *Preventive Medicine*, 40(4), 452-460.
- Whitbeck, L. B., Hoyt, D. R., McMorris, B. J., Chen, X., & Stubben, J. D. (2001). Perceived discrimination and early substance abuse among American Indian children. *Journal of Health and Social Behavior*, 42(4), 405-424.
- Williams, D. R., Mohammed, S. A., Leavell, J., & Collins, C. (2010). Race, socioeconomic status, and health: complexities, ongoing challenges, and research opportunities. *Annals of the New York Academy of Sciences*, 1186(1), 69-101.
- Williams, K. D. (2007). Ostracism. *Annual Review of Psychology*, 58, 425-452.
- Williams, K. D. (2009). Ostracism: Effects of being ignored and excluded. In M. Zanna (Ed.), *Advances in*

experimental social psychology (Vol. 41, pp. 279-314). New York, NY: Academic Press.

Wills, T.A., Gibbons, F.X., Sargent, J.D., Gerrard, M., Lee, H-R., & Dal Cin, S. (2010). Good self-control moderates the effect of mass media on adolescent tobacco and alcohol use: Tests with studies of children and adolescents. *Health Psychology* 29, 539-549.

Wills, T.A., Yeager, A.M. & Sandy, J.M. (2003). Buffering of religiosity for adolescent substance abuse. *Psychology of Addictive Behaviors*, 17(1), 24-31.

Witbrodt, J., Mulia, N., Zemore, S. E., & Kerr, W. C. (2014). Racial/Ethnic disparities in alcohol-related problems: Differences by gender and level of heavy drinking. *Alcoholism: Clinical and Experimental Research*, 38(6), 1662-1670.

Yoo, H. C., & Lee, R. M. (2008). Does ethnic identity buffer or exacerbate the effects of frequent racial discrimination on situational well-being of Asian Americans? *Journal of Counseling Psychology*, 55(1), 63-74.

Figure 1: Mediation of the perceived racial discrimination to health outcomes relationship by health behavior and affect

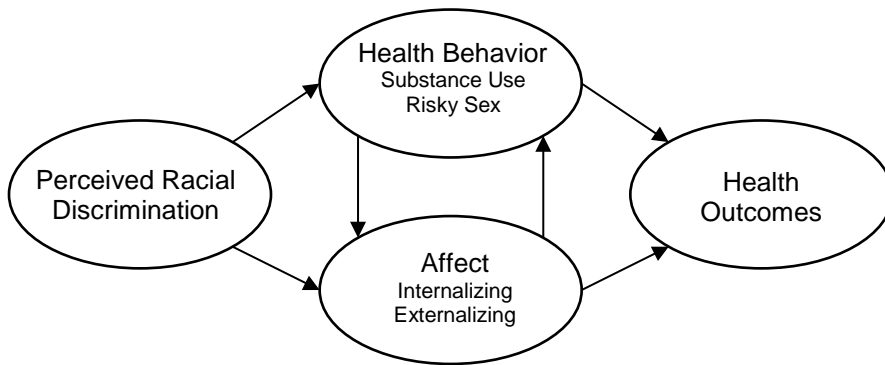


Figure 2. Risk cognitions and negative affect as mediators of the perceived racial discrimination to risk behavior relationship

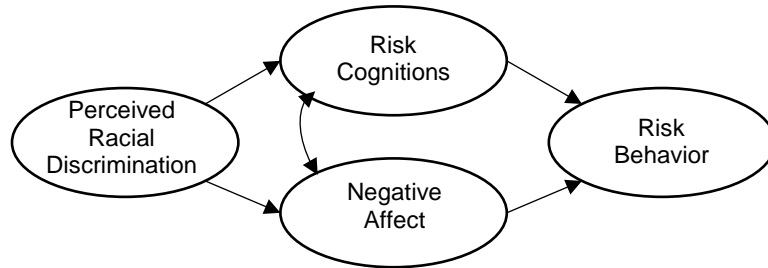


Figure 3: Self-control as a Mediator and Moderator of the Effect of Perceived Racial Discrimination on Substance Use

