

**Section II**  
**Intrapersonal/Individual Factors Associated With**  
**Tobacco-Related Health Disparities**

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**Chapter 5**  
**Stress-Related Processes and**  
**Tobacco-Related Health Disparities**

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## Introduction

Tobacco dependence is a complex disorder with interacting biological, behavioral, and psychosocial determinants. Psychosocial determinants that contribute to tobacco-related behaviors and health outcomes are multifaceted and can be both distal (e.g., socioeconomic status [SES]) and proximal (e.g., knowledge, attitudes, affect, and stress). Psychosocial processes acting within the individual include cognitive factors (e.g., knowledge, attitudes toward smoking and quitting, self-efficacy) and affective factors (e.g., mood states, perceived stress). These psychosocial determinants and processes may operate at each stage of the tobacco use continuum (smoking initiation, prevalence, frequency and intensity, cessation, secondhand smoke exposure, morbidity, and mortality) and result in disparities.

This chapter describes the role of stress-related processes and specific stress indicators in tobacco-related health disparities (TRHD). *Stress* may be defined as the effects of threats, real or implied, to the psychological or physiological integrity of an individual.<sup>1</sup> A *stressor* is the actual or perceived threat to the organism, which leads to the individual's *stress response*. Because stress processes are components of the social-ecological experience of smokers, this chapter focuses on individual/intrapersonal and interpersonal stress processes, while considering community and neighborhood influences on the experience of stress. This review aims to understand what is known about the role of stress at each point along the tobacco use continuum.

This chapter first presents several conceptual frameworks that may help to explain the relationship between stress processes and TRHD. Second, the chapter discusses physiological stress responses and their relationship to disparities in minority racial/ethnic and lesbian, gay, bisexual, and transgender (LGBT) groups. Third, the chapter provides an overview of the influence of perceived stress on the tobacco use continuum and in specific racial/ethnic, gender, and LBGT groups. Fourth, the chapter discusses the relationship between TRHD and the specific stressors of racism and discrimination, psychological disorders (i.e., trauma and post-traumatic stress disorder [PTSD]), and intimate partner violence (IPV) because of their association with smoking prevalence, motivation to quit, and disparate health consequences. More information on the relationship between TRHD and distal factors like SES is provided in chapters 8 (occupation) and 9 (education and income).

## Stress Processes and TRHD: Literature and Conceptual Frameworks

### Stress Processes Literature Search Strategy

The literature search covered four areas: (1) physiological (sympathetic nervous system [SNS] and hypothalamic-pituitary-adrenal [HPA] axis stress responses), (2) perceived stress, (3) discrimination and racism as stress contributors, and (4) other stress-related processes (e.g., post-traumatic stress). The search included all published literature on U.S. participant samples through April 2014. Research investigating perceived neighborhood stress from the individual perspective was eligible for inclusion in the review, but ecological-level stressors related to environmental hazards, high rates of violence and crime, and other variables related to neighborhood disadvantage and SES were not included.

Searches were conducted in the PubMed, PsychInfo, and Web of Science databases. The Boolean search terms for the physiological section of the chapter included smoking, physiological stress, hypothalamic-pituitary-adrenal axis (HPA), parasympathetic nervous system, adrenocorticotrophic hormone (ACTH), neuroendocrine, allostatic load, cortisol, race (substituting each of the following for race: ethnic, African American, black, white, Hispanic, Asian, Native Hawaiian, Pacific Islander, Native American Indian, low SES, lesbian, gay, bisexual, transgender, LGBT, sexuality, disparities, minority), and each level of

the tobacco use continuum. The results of these searches yielded many articles investigating cardiovascular health and obesity that included smoking status as a covariate. The studies were further examined to determine whether they reported findings for stress associations with smoking by racial/ethnic or LGBT status. The search was considered exhaustive when various search term combinations resulted in duplicate or irrelevant studies. Articles were excluded if analyses based on both smoking status or race/ethnicity/sexuality/disparities were not reported.

Search terms for the perceived stress and racial discrimination sections included smoking, race (substituting each of the following for race: ethnicity, low SES, LGBT, sexuality, disparities, minority, discrimination, racism), stress, distress, acculturative stress, and each level of the tobacco use continuum.

In addition to searching electronic databases, the reference lists were also reviewed for published studies to identify additional sources. The final search yielded 47 articles related to tobacco smoking and disparity populations (physiological stress: 0; perceived stress: 26; racism and discrimination: 21).

### Conceptual Frameworks and Physiological Stress Response

This first section provides an overview of conceptual models related to stress processes. The next section briefly reviews the literature on how the effects of stress on health are mediated by the central and peripheral nervous systems, which coordinate the behavioral and physiological changes that enable an individual to respond to stress.

#### Conceptual Frameworks

Several models have been introduced to address the role of stress in shaping behavior, the factors that increase susceptibility to the effects of stress, and the factors that mediate the effects of stress on health. This section reviews four models (the diathesis stress model, transactional model of stress and coping, biosychosocial model, and allostatic load model) and the extent to which the disparity-related literature has applied these models to examine the impact of stress on smoking and health.

The *diathesis stress model* emphasizes the role of dispositional or vulnerability factors in shaping the influence of adverse environmental events on the risk for psychopathology or other health problems.<sup>2</sup> This vulnerability, which could be biological, genetic, or environmental, may magnify the negative quality of stressful events that occur.<sup>3</sup> In the context of smoking behavior, having a genetic or biological predisposition may increase the impact of psychosocial and stress factors on smoking initiation, maintenance, relapse, and disease risk.

The *transactional model of stress and coping*, introduced in the late 1970s, defines stress as a demand exacted by the interaction of both external components of a stressful or challenging situation and the person's appraisal of the situation.<sup>4</sup> In this model, the impact of a stressful event is determined not only by the properties of the situation itself but also by the person's perception of it, which includes the person's perception of his/her ability to overcome this challenge as well as previous experiences with similar situations. Thus, the impact of the stressor will be determined by how much the person perceives the situation as threatening and overwhelming relative to his/her coping ability. This model introduced concepts related to coping, including primary and secondary appraisals of stress. Primary appraisals focus on evaluating the stressor itself and its characteristics. Secondary appraisals focus on evaluation of

one's abilities and resources to cope with the stressor. The balance of these two types of appraisals determines the perception of the stressor as a threat or as a mere challenge to be overcome.

The transactional model conceptualizes coping as problem or emotion focused. Problem-focused coping refers to the use of behavioral and problem-solving strategies to address the sources of stress directly and attempt to modify the situations that produce stress. Emotion-focused strategies concentrate efforts on the person, addressing his/her cognitive or emotional reactions to the stressful events or actions to mitigate the impact of the stressor. Cigarette smoking is a behavioral method that is widely used to cope with stress and negative affect. To the extent that stress levels vary across groups, high stress levels in some groups may increase the likelihood of cigarette smoking as a coping method and therefore affect smoking consequences.

The *biopsychosocial model* integrates multiple influences—psychological (e.g., thoughts and emotions), biological (e.g., genetic), and social factors (e.g., cultural and environmental)—and considers the interaction of these factors in increasing risk for diseases or behavioral disorders.<sup>5</sup> According to this model, stress is a psychological condition that could influence tobacco use, along with biological factors such as the pharmacological effects of tobacco, other psychological conditions (e.g., emotional status), and social conditions (e.g., peers, modeling, and neighborhood). These factors may influence not only initiation, but also maintenance of smoking and the harm caused by smoking. The biopsychosocial model has been widely used in advocating a multimodal approach to conceptualizing, assessing, and treating disease. The influence of this approach has extended across multiple disciplines, although some concerns about its limitations have been expressed.<sup>6</sup>

Finally, the *allostasis model of stress* highlights the importance of neuroendocrine adaptation in response to stressors.<sup>7</sup> In normal, healthy neuroendocrine–immune function, adaptive systems are activated and deactivated infrequently over short time periods. Chronic activation over the life span can result in dysregulation (i.e., hyporesponsivity or hyperresponsivity) of the physiological stress response, referred to as allostatic load. McEwen<sup>7</sup> suggests that allostatic load can compromise immune system functioning and facilitate pathogenesis. To the extent that racial/ethnic minority groups and LGBT individuals may experience greater allostatic load, this model has implications for disparities in tobacco-related outcomes.

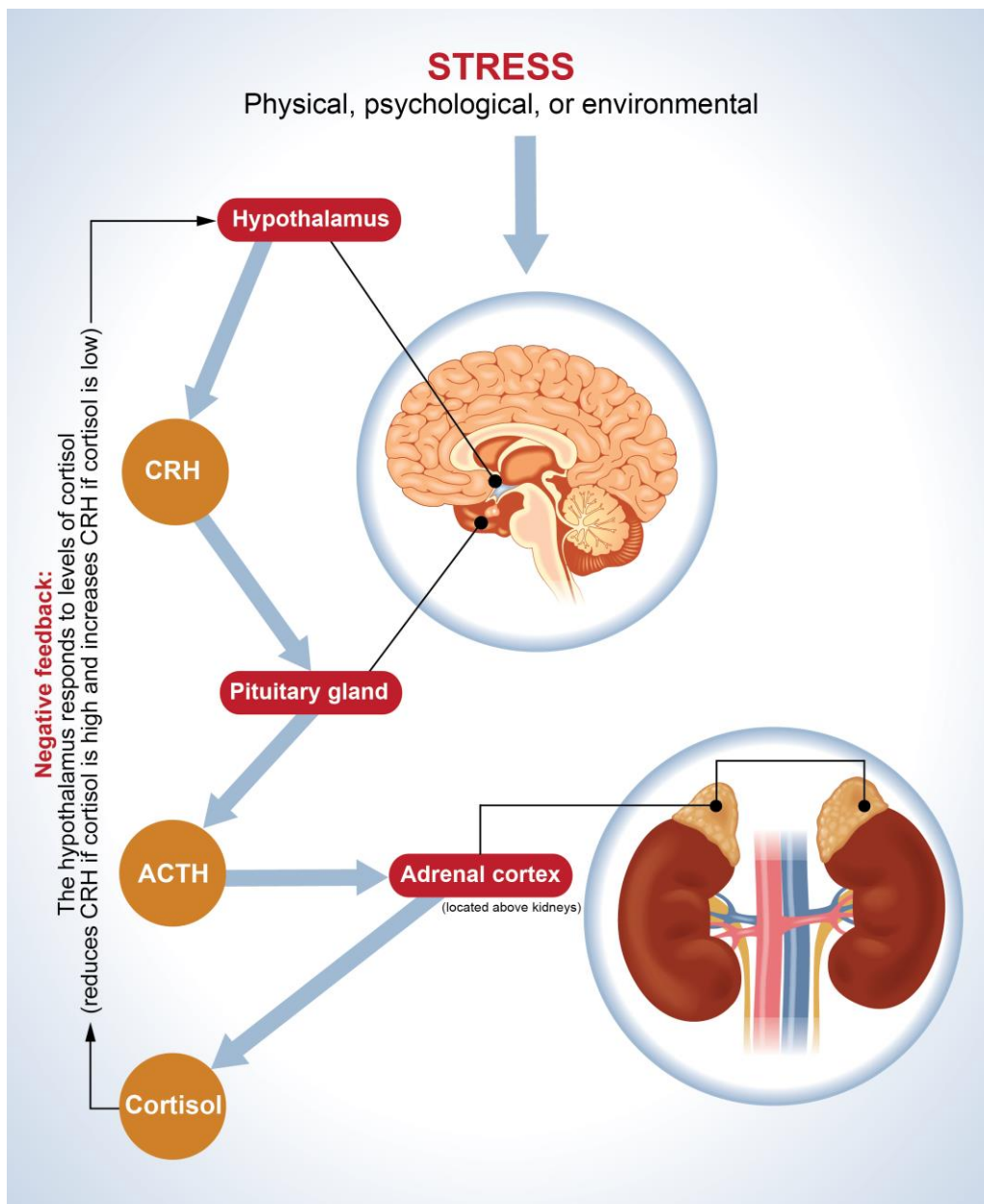
This review of the relationships between stress and smoking in disadvantaged populations identified very few studies grounded in one or more of the above models of stress. The extent to which these established models can be generalized to the tobacco use continuum in these racial/ethnic, gender, and LGBT groups is unknown. Research incorporating these stress frameworks as well as new conceptualizations is needed to better understand the relationship between stress and the tobacco use continuum.

### *Nicotine and Physiological Stress Response Systems*

The effects of stress on health are mediated by the central and peripheral nervous systems, which coordinate the behavioral and physiological changes that enable an individual to respond to stress. This section presents information on the effects of nicotine, one of the primary constituents responsible for tobacco addiction, on physiological stress response.

Several brain structures are involved in the perception of external and internal events as threatening or stressful and in regulating the stress response. The two neurobiological systems that directly regulate the physiological stress response are the HPA axis (see Figure 5.1) and the sympatho-adrenomedullary system. The HPA axis is also involved in mediating the effects of nicotine.<sup>8-11</sup> The stimulating effects of acute doses of nicotine on stress-related biological systems, including the HPA axis, the SNS, and the endogenous opioid system, have been documented in several laboratories.<sup>12-16</sup> The SNS plays an essential role in the body's acute adjustments to normal demands, and is involved in integrating and expressing the physiological and behavioral responses known as the fight-or-flight response.

**Figure 5.1 Hypothalamic-Pituitary-Adrenal Axis**



Notes: CRH = corticotropin-releasing hormone. ACTH = adrenocorticotropic hormone.

Nicotine's effects on neurobiological stress response systems are centrally mediated, although the specific pathways have not been fully elucidated. Nicotine stimulates dopaminergic, noradrenergic, and serotonergic neurotransmission.<sup>17–19</sup> Vreeburg and colleagues<sup>20</sup> found that current smoking was associated with higher levels of cortisol, a hormone released at awakening, in the evening and in response to stress. Experimental evidence is consistent with other research examining the impact of stress on tobacco smoking. Using a within-subjects design, McKee and colleagues<sup>21</sup> exposed nicotine-deprived smokers to either neutral-personalized or stress-personalized imagery across a 2-day period. The stress-inducing imagery diminished the ability to delay smoking for a short time period compared to neutral imagery. Stress also led to greater HPA axis reactivity, cravings, puffing intensity, and perceived positive reinforcement in comparison to the neutral condition. This research has implications for the role of stress in smoking cessation disparities across racial/ethnic groups. For example, the greater allostatic load among racial/ethnic minority groups due to the cumulative effects of daily stress might be related to the greater difficulty in quitting observed in these populations.

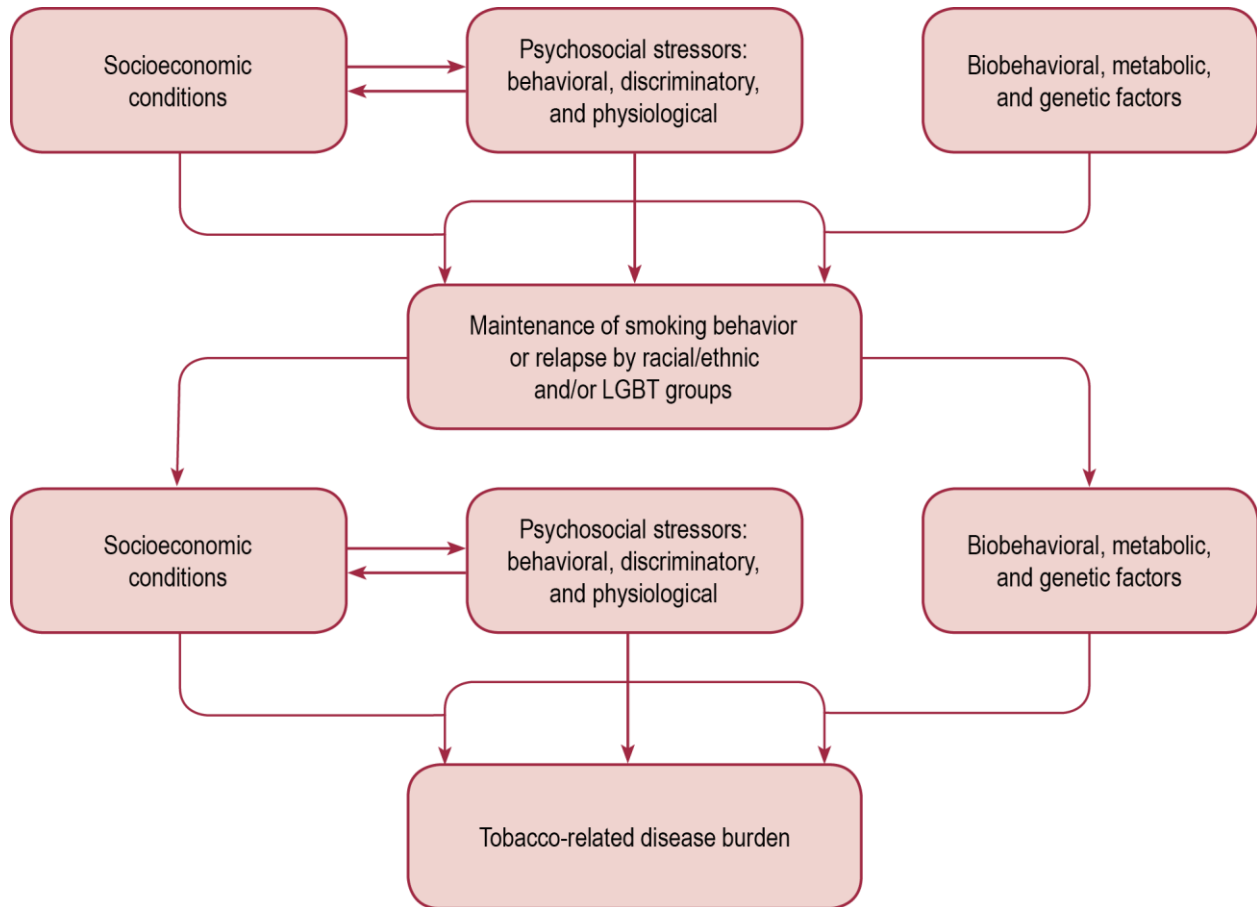
### **Physiological Stress Processes and Health in Racial/Ethnic and LGBT Groups**

An individual's manner and intensity of stress response are influenced by several dispositional, environmental, and situational factors. Variables related to membership in racial/ethnic and LGBT groups could influence the impact of stress and the individual's ability to cope with it. Accounting for these factors is important, considering the potential harmful effects of stress on smoking behavior and related health outcomes.

In accordance with the allostasis model, greater exposure to stress may contribute to racial/ethnic health disparities.<sup>22</sup> Evidence indicates greater risk of allostatic load for African Americans compared to whites.<sup>23</sup> Relationships between psychosocial factors, smoking, and health burden in racial/ethnic and LGBT groups are multifaceted and are mediated in part by stress processes (Figure 5.2). Race/ethnicity is independently associated with the prevalence of both recent and lifetime stressful events.<sup>24</sup> LGBT groups also experience stressors that impact overall quality of life, such as structural discrimination and stigmatization.<sup>25</sup> Chronic activation of the stress response system can result in pathogenic processes.<sup>26</sup> Studies show that the cumulative effects of high-stress circumstances robustly predict morbidity and mortality from chronic obstructive pulmonary disease (COPD) and lung cancer.<sup>27,28</sup>



**Figure 5.2 Relationships Between Biopsychosocial Factors and Tobacco Use Among Racial/Ethnic and LGBT Groups and Their Effects on Health**



Note: LGBT = lesbian, gay, bisexual, and transgender.

### Racial/Ethnic Differences in Sympathetic Nervous System and Hypothalamic-Pituitary-Adrenal Axis Functioning

The few studies that have examined physiological stress processes in relation to smoking or tobacco use for each racial/ethnic group provide initial evidence of differential SNS and HPA functioning by race/ethnicity. Most of these studies compare African Americans and whites; they do not include or report outcomes for other racial/ethnic minority groups, nor do they examine LGBT groups.

In one comprehensive investigation, Skinner and colleagues<sup>23</sup> examined patterns of HPA regulation among African American and white young adults and assessed smoking behavior over a 3-day period. These researchers hypothesized that HPA functioning varied for the two groups as a function of the African Americans' exposure to stressors (e.g., discrimination, racism, daily race-related hassles, financial strain, past-year life problems, stressful life events, neighborhood quality, personal experiences with violence, and family conflict). Results confirmed the greater stress experiences of African Americans relative to whites. Blunted diurnal rhythms were related to smoking among whites but not among African Americans. Although the authors did not offer an interpretation of the latter finding, the relationship between smoking and diurnal rhythms in African Americans might have been obscured by the slower overall cortisol decline. In a study of pregnant women, Suglia and colleagues<sup>29</sup> found that

African Americans who reported high cumulative stress (interpersonal violence, discrimination, negative family-related life events, and community violence) also had lower cortisol levels on awakening and a flatter slope throughout the day compared to Hispanics.

The existing research has considered multiple indexes of HPA axis responses, such as cortisol reactivity at different points throughout the day and adrenocorticotrophic hormone (ACTH) levels. Within the half-hour following a public-speaking stressor, Chong and colleagues<sup>30</sup> found a 36% greater cortisol response (95% confidence interval [CI] 10%–67%) and 35% higher mean plasma ACTH levels (95% CI 16%–58%) in white men and women compared to African American men and women. Compared with white women, African American women have shown greater plasma ACTH immunoreactivity (ACTH-IR) following intense exercise<sup>31</sup> and lower allopregnanolone (ALLO) following psychological stress.<sup>32</sup> A study of the relationship between race and HPA response in African American and white men found greater ACTH concentrations in African Americans than whites after equal intravenous administration of corticotropin-releasing hormone (CRH).<sup>33</sup> In another study, Cohen and colleagues<sup>34</sup> found that African Americans in the Coronary Artery Risk Development in Young Adults (CARDIA) study were more likely to have higher evening cortisol levels than whites. These findings suggest there may be racial differences in HPA functioning.

### Discrimination and Hypothalamic-Pituitary-Adrenal Responses

Research suggests that neuroendocrine functioning may be directly impacted by perceived discrimination. (Discrimination and its role in TRHD are also discussed in chapters 6 and 8.) Racism refers to a pejorative reaction to an individual or group based on the belief that all members of a racial category possess characteristics that render them inferior to another race (or races). Discrimination refers to intentional acts based on racial, ethnic, or sexual identification that are unfair or injurious, and that benefit the “in” versus “out” group. Landrine and Klonoff<sup>35</sup> conceptualized racial discrimination (i.e., racist events) as culturally specific stressors. Individuals and groups with racial/ethnic minority status experience negative stressors because of their group membership. These stressors may be direct and explicit acts of discrimination or indirect and subtle attitudes or behaviors.<sup>36</sup> Racial and ethnic minority groups have experienced greater racial discrimination than whites historically and currently, in the 21st century.<sup>37,38</sup>

Jamieson and colleagues<sup>39</sup> exposed African American and white participants to social rejection by same-race or cross-race partners (conceptualized as discrimination) in a computer-based experiment. These researchers found that for both African American and white participants, cross-race rejection led to lower cortisol reactivity, greater anger, and risky behavior compared to rejection by partners of the same race, suggesting that racial discrimination influences physiological responses, cognition, and risk behaviors.

### Hypothalamic-Pituitary-Adrenal Axis Regulation and TRHD

Findings from studies comparing HPA axis regulation by race/ethnicity have implications for TRHD. Among participants in the Boston Puerto Rican Health Study, allostatic load and smoking were among the strongest correlates of poor self-rated health.<sup>40</sup> Indeed, chronic diseases may be a consequence of maladaptive elevation or attenuated responses of the HPA system.<sup>41</sup> This differential HPA functioning across vulnerable populations may contribute to significant disparities in smoking-related morbidity. Multiple stress response processes influence how individuals respond to acute and chronic nicotine exposure. It is possible that the blunting effect of habitual nicotine exposure on neuroendocrine

responses combined with minority populations' greater difficulty maintaining abstinence<sup>42</sup> leads to variations in HPA axis activity that may contribute disproportionately to adverse health outcomes. However, no studies have explicitly compared HPA axis hormones in plasma, urine, or saliva of smokers across racial/ethnic or LGBT groups. Thus, there are large gaps in what is known about how much physiological stress contributes to disparities in tobacco cessation and health.

## Perceived Stress and Tobacco Use: Overview

A large body of research has demonstrated the clear link between perceived stress and all phases of the nicotine addiction process, including initiation, maintenance, and relapse.<sup>43</sup> Stress is widely cited by smokers as the reason they continue to smoke or relapse to cigarette smoking after cessation. Tobacco dependence is a complex phenomenon that involves multiple bio-neurological, psychosocial, and behavioral processes, but growing evidence suggests that perceived stress and expectation of relief are important motivators for smoking.

Perceived stress is a multidimensional construct, and research has considered the effects of different types of stress on smoking status. Mulder and colleagues<sup>44</sup> demonstrated that multiple types of stressors (financial problems, low perceived health, low perceived life control, and lack of social support) were directly related to smoking, and partially mediated the association between education level and smoking. Moreover, residing in highly stressful communities is associated with increased risks of smoking-related illnesses, such as cancer and COPD.<sup>27</sup> Slopen and colleagues<sup>45</sup> examined the relationships between psychosocial stress and smoking among a national cohort of 4,938 U.S. adults at baseline and at follow-up, 9 to 10 years later. They found that high levels of psychosocial stress (related to relationships, finances, employment, perceived inequality, past-year family problems, and overall stress) at baseline and follow-up were associated with increased odds of persistent smoking (odds ratio [OR] 1.40; 95% CI 1.08–1.81). In a sample of low-income smokers in a randomized trial, Bock and colleagues<sup>46</sup> found that elevated stress levels predicted lower abstinence rates over a 1-year period. Qualitative findings suggest that high-stress environments may also negatively influence smokers' attempts to seek help with cessation, even when cessation assistance is available at no financial cost.<sup>47</sup>

Several studies address the relationship between stress and smoking behaviors in various racial/ethnic groups. Most of this research has been conducted among African Americans, but there is evidence that stress also affects smoking in other groups. Among young adults (ages 18 to 36) of various racial/ethnic backgrounds, stress represents a risk factor for smoking initiation<sup>48</sup>; among adults age 25 and older, psychosocial stress was a mediating factor in current smoking.<sup>49</sup> In multiethnic samples, perceived stress/negative affect has been found to indirectly mediate relationships between low SES and smoking relapse through low self-agency.<sup>50,51</sup>

Qualitative findings from primarily minority racial/ethnic groups in a disadvantaged community in South Bronx, New York, highlight the high stress levels associated with a number of factors (financial problems, housing concerns, personal and family health problems, safety issues, and employment conditions) and the possibility that smoking is a pathway linking stress to disparities.<sup>52</sup> Other studies have found that racial/ethnic differences in daily stressors may contribute to physical and mental health disparities.<sup>53–55</sup> Table 5.1 summarizes research on perceived stress and smoking in minority communities.

**Table 5.1 Studies Examining Perceived Stress and Tobacco Use Among Racial/Ethnic and LGBT Groups, 1991–2013**

Author (year)	Population(s)	Study design	Stress constructs	Findings
<b>African American (majority of sample)</b>				
Beech and Scarinci 2003 <sup>58</sup>	Low-income African Americans	Qualitative		Focus groups explored the sociocultural factors associated with smoking attitudes and practices among low-income African American young adults. One focus group theme was that smoking is perceived as relieving stress.
Berg et al. 2010 <sup>65</sup>	African American smokers, treatment-seekers	Prospective	Global perceived stress	Positive association with smoking reduction*; lower perceived stress predicted cessation at week 26*
Businelle et al. 2009 <sup>59</sup>	African Americans, treatment-seekers	Cross-sectional	Global perceived stress	Light smokers reported lower perceived stress than moderate to heavy smokers*
Manfredi et al. 2007 <sup>67</sup>	Low-income, women, African American, treatment-seekers	Cross-sectional	Global perceived stress	Indirectly mediated intentions and cessation through low self-efficacy*
Manning et al. 2005 <sup>66</sup>	Low-income African American smokers, treatment-seekers	Longitudinal, prospective	Global perceived stress, daily hassles	Baseline levels not predictive of cessation; concurrent stress inversely associated with abstinence*; reductions from baseline to EOT positively predicted abstinence*
Romano et al. 1991 <sup>56</sup>	African Americans	Cross-sectional, random sampling, community survey	Daily hassles	Positive association with smoking status*
Sheffer et al. 2011 <sup>47</sup>	African Americans	Qualitative	Stress related to low SES, occupation, environment; daily hassles	Stress identified as a “root cause” of tobacco use
Slopen et al. 2012 <sup>57</sup>	African Americans	Cross-sectional	11 stress domains: psychological work stress, physical work stress, work–family conflict, perceived inequality, relationship stress, neighborhood stress, discrimination, financial stress, problems in immediate family during the past year, stressful life events, and childhood adversity	7 of 11 stressors exhibited positive associations with being a current smoker*: neighborhood, financial, relationship, and psychological work stress, perceived inequality, stressful events, childhood adversity
Webb and Carey 2008 <sup>61</sup>	Low-income African American women	Cross-sectional	Global perceived stress	Positive associations with light, moderate, and heavy smoking*
Webb and Carey 2009 <sup>69</sup>	Low-income, African Americans, treatment-seekers	Cross-sectional	Global perceived stress	Positive association with smoking-related symptoms*; positive associations with cardiovascular* and gastrointestinal symptoms*

Table 5.1 continued

Author (year)	Population(s)	Study design	Stress constructs	Findings
<b>African American and other groups</b>				
Kiviniemi et al. 2011 <sup>64</sup>	Whites, African Americans, Hispanics	Cross-sectional, nationally representative telephone survey	Psychological distress (e.g., sad, nervous)	Positive association with current smoking and smoking intensity among whites only*
Ludman et al. 2002 <sup>60</sup>	Low-income white and African American women	Cross-sectional	Global perceived stress	Positive association with smoking dependence among African American women only*
Martinez et al. 2010 <sup>72</sup>	African Americans, Hispanics, others, treatment-seekers	Cross-sectional	Global perceived stress	Inverse association with cessation self-efficacy in full sample*; Hispanics reported cessation self-efficacy when facing internal stimuli*
Maxson et al. 2012 <sup>63</sup>	White and African American pregnant women	Cross-sectional	Global perceived stress	Positive associations with current* and former smoking*
Schulz et al. 2008 <sup>49</sup>	African Americans, whites, Hispanics	Cross-sectional, probability sampling	Psychosocial stress	Positive association with current smoking*
<b>Non-African American</b>				
Borrelli et al. 2011 <sup>70</sup>	Dominicans, Puerto Ricans, non-Hispanic whites	Cross-sectional	Daily hassles	Dominicans reported greater stress than non-Hispanic white smokers
Friis et al. 2006 <sup>78</sup>	Cambodian Americans living in California	Qualitative	Psychosocial (family and relationship problems) and stress related to home environment	Positive association between stress and smoking intensity; smoking to cope with family-related stress
Hayes and Borrelli 2013 <sup>71</sup>	Hispanics	Cross-sectional	Global perceived stress	Positive association with smoking intensity*
Hodge et al. 1996 <sup>75</sup>	American Indians	Descriptive, cross-sectional	Daily hassles	Positive association with living in urban vs. rural areas*
Honda 2005 <sup>73</sup>	Non-Hispanic whites, non-Hispanic blacks, Hispanics, others, ages ≥ 60 years	Cross-sectional, nationally representative survey	Psychological distress (e.g., sad, nervous)	Positive association with current smoking*; Hispanics less likely to be former/never-smokers than non-Hispanic whites*
Spigner et al. 2005 <sup>77</sup>	Chinese American and Vietnamese American men	Qualitative		One focus group theme was smoking to alleviate stress
<b>Lesbian, Gay, Bisexual, and Transgender</b>				
Blosnich 2012 <sup>82</sup>	Lesbian, gay, and bisexual	Cross-sectional	Physical violence, stress related to sexual orientation	Violence victimization positively associated with current smoking,* particularly among bisexuals*; gay-related stress positively associated with smoking among males*

Table 5.1 continued

Author (year)	Population(s)	Study design	Stress constructs	Findings
Johns et al. 2013 <sup>123</sup>	LGBT women	Cross-sectional, observational	Daily hassles	Positive association with current smoking*; no association with smoking frequency or intensity
Rosario et al. 2008 <sup>83</sup>	Lesbian and bisexual youth, ages 14–21 years	Longitudinal, prospective	Gay-related stressful life events, internalized gay-related stress (internalized homophobia), emotional distress (e.g., depressive symptoms)	Gay-related stress, internalized homophobia; emotional distress mediated an association between butch/femme identification and smoking*
Rosario et al. 2011 <sup>84</sup>	Lesbian, bisexual, and gay youth	Longitudinal, prospective	Gay-related stressful life events, interpersonal stress, psychological distress	Stressful life events positively associated with current smoking, * smoking status moderated association between stress and distress*

Notes: SES = socioeconomic status. EOT = end of treatment. LGBT = lesbian, gay, bisexual, and transgender. Gay-related stress refers to gay-related stressful events, negative attitudes toward homosexuality, and discomfort with homosexuality.

\*Finding was statistically significant.

## Perceived Stress and Tobacco Use: African Americans

### *Current Smoking and Smoking Intensity*

Perceived stress appears to be associated with smoking risk and maintenance among African American smokers. Using a random sampling design to survey African American households in the San Francisco Bay area, Romano and colleagues<sup>56</sup> found that high levels of stress were associated with current smoking, compared to lower stress levels. Slopen and colleagues<sup>57</sup> conducted a comprehensive assessment of the stress–smoking relationship in African Americans, considering 11 distinct stressors (e.g., work–family conflict, perceived inequality, relationship stress, and stressful events). Seven of the 11 stressors and a cumulative stress score were significant risk factors for current smoking versus never smoking. In addition, the risk of smoking increased more than threefold, with scores in the highest quartiles on five or more stressors. In a qualitative study with 18- to 35-year-old low-income African American smokers, Beech and Scarinci<sup>58</sup> concluded that relief from stress may be a contextual factor related to smoking in this group. Perceived stress is also associated with smoking intensity (number of cigarettes smoked per day) among African American treatment-seekers, such that light smokers (5–10 daily cigarettes) report less stress.<sup>59</sup> Thus, high-stress environments may have implications for smoking risk among African Americans.

### *Current Smoking and Smoking Intensity Among Women*

Several studies have examined perceptions of stress and smoking among African American women. Ludman and colleagues<sup>60</sup> compared low-income African American and white female smokers and found that perceived stress was related to smoking intensity among African American women but not among white women. Webb and Carey<sup>61</sup> found a positive association between perceived stress and current smoking in a community-based sample of African American women. Two studies that focused on correlates of smoking status among pregnant African American women found positive associations between perceived stress and smoking.<sup>62,63</sup>

### *Current Smoking and Distress*

One study has examined the relationship between psychological distress and current smoking in a nationally representative sample. Using data from the 2007 Health Information National Trends Survey (HINTS), Kiviniemi and colleagues<sup>64</sup> demonstrated an interaction between race/ethnicity and generalized psychological distress, such that past 30-day psychological distress was positively related to smoking among whites, but not African Americans or Hispanics. The authors note limitations of their study including its cross-sectional nature and that the HINTS survey measured overall psychological distress.

### *Smoking Cessation*

Perceptions of stress are predictive of smoking cessation in the general population, and some research has examined this phenomenon among African Americans. Berg and colleagues<sup>65</sup> considered perceived stress as a factor influencing trajectories of smoking-related behavior changes among treatment-seekers over 6 months, including reductions in daily smoking, cessation, or no behavior change. Contrary to expectations, reductions in smoking were not predicted by lower baseline perceived stress. However, consistent with previous literature, this study found that lower perceived stress levels predicted smoking cessation at week 26.

Manning and colleagues<sup>66</sup> examined the association between perceived stress and smoking cessation among African Americans in the placebo arm of a bupropion randomized controlled trial. Baseline perceived stress levels were not predictive of end-of-treatment or 6-month cessation, but greater concurrent stress was associated with failure to quit. Two other studies included perceived stress in conceptual models to understand smoking cessation among African Americans in the treatment context. Manfredi and colleagues<sup>67</sup> found that perceived stress was a cessation barrier among women (sample was 77% African American) at 6 months after treatment, acting indirectly through low self-efficacy, which in turn impacted quitting plans and cessation. Reitzel and colleagues<sup>68</sup> found that the relationship between social cohesion and 6-month continuous abstinence was indirectly mediated by perceived stress.

### *Tobacco-Related Morbidity*

Few studies have specifically investigated the influence of perceived stress on tobacco-related morbidity among African Americans. Webb and Carey<sup>69</sup> focused on stress as a psychosocial factor that may influence early health symptoms in a sample of African American treatment-seekers. Results confirmed a high prevalence of the early health consequences of smoking, such as shortness of breath (66%) and coughing (50%). After adjustment for sociodemographics, smoking, and medical history, perceived stress was independently associated with smoking-related symptoms. As suggested by models for examining TRHD,<sup>53</sup> health outcomes among smokers are a function of multilevel influences, including perceived stress.

### *Summary of African Americans, Stress, and Smoking*

African American smokers appear to exhibit high levels of global, specific, and unique stressors, which may contribute to health disparities. An abundant literature supports the association between perceived stress and smoking risk and maintenance among African Americans. For relationships with the other stages along the tobacco use continuum, such as cessation and morbidity, there is less evidence, and no studies have examined stress and mortality among African Americans with a tobacco use history. The

literature is characterized by methodological limitations: With few exceptions, studies of the association between perceived stress and smoking status in this population have relied on convenience and/or treatment-seeking samples and cross-sectional designs. Perceived stress, in particular, is positively associated with current smoking, smoking intensity, and specific types of stressors (environmental or neighborhood).

### Perceived Stress and Tobacco Use: Hispanics/Latinos

Although the prevalence of cigarette smoking in the aggregate Hispanic category is relatively low, the evidence suggests that as immigrants acculturate to mainstream attitudes, beliefs, and practices, current cigarette smoking may be affected, although the direction of the relationship depends on multiple factors (discussed further in chapter 7). Little is known regarding the relationship between stress and smoking in this heterogeneous ethnic group.

In a sample of Hispanic and white smoking caregivers for children with asthma, Borrelli and colleagues<sup>70</sup> found that Dominicans reported greater stress, and factors such as lower nicotine dependence were positively associated with smoking cessation. Hayes and Borrelli<sup>71</sup> examined differences in psychosocial characteristics among treatment-seeking Hispanics who were light smokers (3–9 cigarettes per day) and moderate/heavy smokers (10 or more cigarettes per day). Perceived stress was greater among heavier smokers compared to light smokers, yet there were no differences in smoking cessation between groups at 2- and 3-month follow-ups.

Additionally, two studies have also investigated psychosocial processes associated with smoking cessation among multiethnic samples that included Hispanics. Martinez and colleagues<sup>72</sup> demonstrated that perceived stress was inversely related to cessation self-efficacy in a multiethnic sample that included a representative proportion of Hispanics. They found that compared to other ethnic groups, treatment-seeking Hispanics reported lower cessation self-efficacy upon encountering internal stimuli, although they did not test the interaction between ethnicity and stress on self-efficacy specifically. Honda<sup>73</sup> examined correlates of smoking cessation among older ever-smokers using data from the 2000 National Health Interview Survey (NHIS). This study found that psychological distress was lower among former smokers in general, and suggested that Hispanic ethnicity was an independent barrier to cessation. Studies have not reported data on other specific Hispanic groups.

### Perceived Stress and Tobacco Use: American Indians/Alaska Natives

American Indians/Alaska Natives as an aggregate group have the highest smoking prevalence of all racial/ethnic groups in the United States,<sup>74</sup> but little is known about the association between perceived stress and smoking in this aggregate group. Hodge and colleagues<sup>75</sup> assessed daily hassles, an indicator of stress, in a sample of American Indian primary care patients, and found that those who lived in urban rather than rural areas had higher smoking prevalence rates and reported greater stress and less social support. No studies have examined associations between stress and other dimensions along the tobacco use continuum. Studies have not reported data for specific American Indian or Alaska Native groups.

### Perceived Stress and Tobacco Use: Asian Americans

No quantitative studies have examined the relationship between perceived stress and smoking among the Asian American aggregate group. Acculturative stress—measured using 7 items most relevant to South Korean students taken from the 36-item Acculturative Stress Scale—has been associated with an



increase in smoking among students from South Korea studying at U.S. universities.<sup>76</sup> Spigner and colleagues<sup>77</sup> conducted a qualitative investigation of tobacco-related perceptions among 30 Chinese and Vietnamese immigrants. Among the themes participants discussed during focus groups was the use of smoking as a method of alleviating stress. Friis and colleagues<sup>78</sup> assessed predisposing, reinforcing, and enabling as theoretical factors that may be associated with smoking status in a sample of Cambodian Americans in California. Using qualitative methods, they concluded that smoking is used to manage stress. Participants described increased smoking frequency during stressful times, when they experienced financial problems, family and relationship difficulties, or home environment problems. These few studies suggest that some Asian American groups may use smoking as a coping strategy during stressful periods.

### **Perceived Stress and Tobacco Use: Native Hawaiians and Other Pacific Islanders**

The relationship between perceived stress and smoking among Native Hawaiians and Other Pacific Islanders has not been extensively examined by researchers. Hickman and colleagues<sup>79</sup> found that psychological distress was positively associated with menthol cigarette smoking in this population. As noted earlier, however, distress is more closely aligned with depressive symptoms than perceptions of stress.

### **Perceived Stress and Tobacco Use: LGBT Populations**

As discussed in chapter 2, smoking rates among individuals who identify as LGBT exceed the national average. Blosnich and colleagues,<sup>80</sup> in a systematic review focusing on the etiology of tobacco-related disparities among LGBT groups, confirmed that few studies have examined the stress–smoking association in these vulnerable populations. Some evidence has suggested that these individuals experience greater risk factors for smoking, including stress, than heterosexuals. Since the publication of Blosnich and colleagues' review,<sup>80</sup> a study by Johns and colleagues<sup>81</sup> found that perceived stress was positively associated with current smoking among LGBT groups, while discrimination was not associated with current smoking. In addition, perceived stress was not associated with the frequency of smoking (daily versus some day) or intensity (number of cigarettes per day), but discriminatory events increased the likelihood of daily (versus some days) smoking. Another study by Blosnich<sup>82</sup> focused on the relationship between unique stressors (being the victim of violence or discrimination) and smoking among LGBT individuals ages 18–24. Current smoking was positively associated with experiences of physical violence, and gay-related stress (gay-related stressful events, negative attitudes toward homosexuality, and discomfort with homosexuality) was associated with greater likelihood of smoking among males than among females. The positive association between smoking and gay-related stress has also been found among young (ages 14–21) ethnically diverse lesbian and bisexual women in a community-based sample.<sup>83</sup> Rosario and colleagues<sup>84</sup> showed that stress moderated the relationship between smoking and psychological distress in a sample of 14- to 21-year old lesbian, gay, and bisexual individuals: No differences in distress were found between smokers and nonsmokers in low-stress conditions, but high stress among smokers (but not nonsmokers) was related to elevated distress. In short, perceived stress and sexuality-specific stress have been associated with smoking status. No studies have considered the role of perceived stress in smoking cessation, relapse, or morbidity in LGBT populations.

## Racism and Discrimination and Their Relationship to Disparities

Because of the social categories to which they belong, members of racial/ethnic, gender, and LGBT groups in the United States can experience racism and discrimination. This section discusses the evidence on the relationship between racism and discrimination and TRHD. Racism and discrimination can be direct but can also be subtle and elusive, making it difficult to identify these events in some situations. This section describes the research focused on racism, discrimination, and health, and discusses studies that examined the associations between racism, discrimination, and smoking. Most of this research has focused on the experiences of African Americans, although literature on this topic is emerging for other groups.

### Racism, Discrimination, and Health

The influence of racism and discrimination on biological indicators of health has been investigated in many studies. Perceived racial discrimination jeopardizes the physical well-being of members of racial/ethnic minority groups.<sup>85</sup> For instance, perceived racial discrimination is associated with changes in blood pressure among African Americans, particularly when social support is low.<sup>86</sup> Fang and Myers<sup>87</sup> found that when African American and white men viewed video excerpts illustrating neutral, anger-provoking, and racist situations, diastolic blood pressure increased in both groups following both racist and anger-provoking stimuli. Although there was no racial difference in blood pressure, the authors suggested that cardiovascular reactivity resulting from African Americans' long-term exposure to stress-inducing racist situations might lead to health disparities. Gyll and colleagues<sup>88</sup> found that African American women had greater diastolic blood pressure reactivity than white women after completing a speech task in which they defended themselves against an accusation of shoplifting. African American women who perceived the accusation as racial discrimination exhibited even greater reactivity compared to those who did not. Kwate and colleagues<sup>89</sup> found an inverse relationship between lifetime experiences with racism and perceived health status, and a positive association between racist events and lifetime physical disease. Cruz<sup>90</sup> found significantly elevated salivary cortisol levels among African Americans and Hispanics who viewed videos of racist acts compared to baseline and the control group. Findings from this study suggest that racist experiences have a negative influence on stress processes, specifically physiological processes in African Americans and Hispanics.

### Mechanisms Linking Racism and Discrimination to Tobacco Use

Several models have been proposed to explain the relationships between discrimination and smoking. Pascoe and Richman's model<sup>36</sup> suggests that mental and physical health and engagement in unhealthy behaviors contribute to the positive association between perceived racial discrimination and smoking. The stress-process model described by Pearlin and colleagues<sup>91</sup> suggests that individual variability in response to a stressor (especially cognitive and emotional responses) and the availability of adaptive coping resources (such as resilience, social support, and self-efficacy) determine subsequent behavioral and physical outcomes.

The prevailing perspective, however, is that the stress response to racist or discriminatory experiences is the primary factor explaining the association between racial discrimination and smoking.<sup>92,93</sup> It is likely that the effects of racism and discrimination vary from person to person, depending on the individual's appraisal processes. For example, Cuevas and colleagues<sup>94</sup> examined stress as a mediator of the relationship between discrimination and current smoking in a sample of 1,363 African American adults; they found that higher levels of perceived discrimination were associated with higher stress and

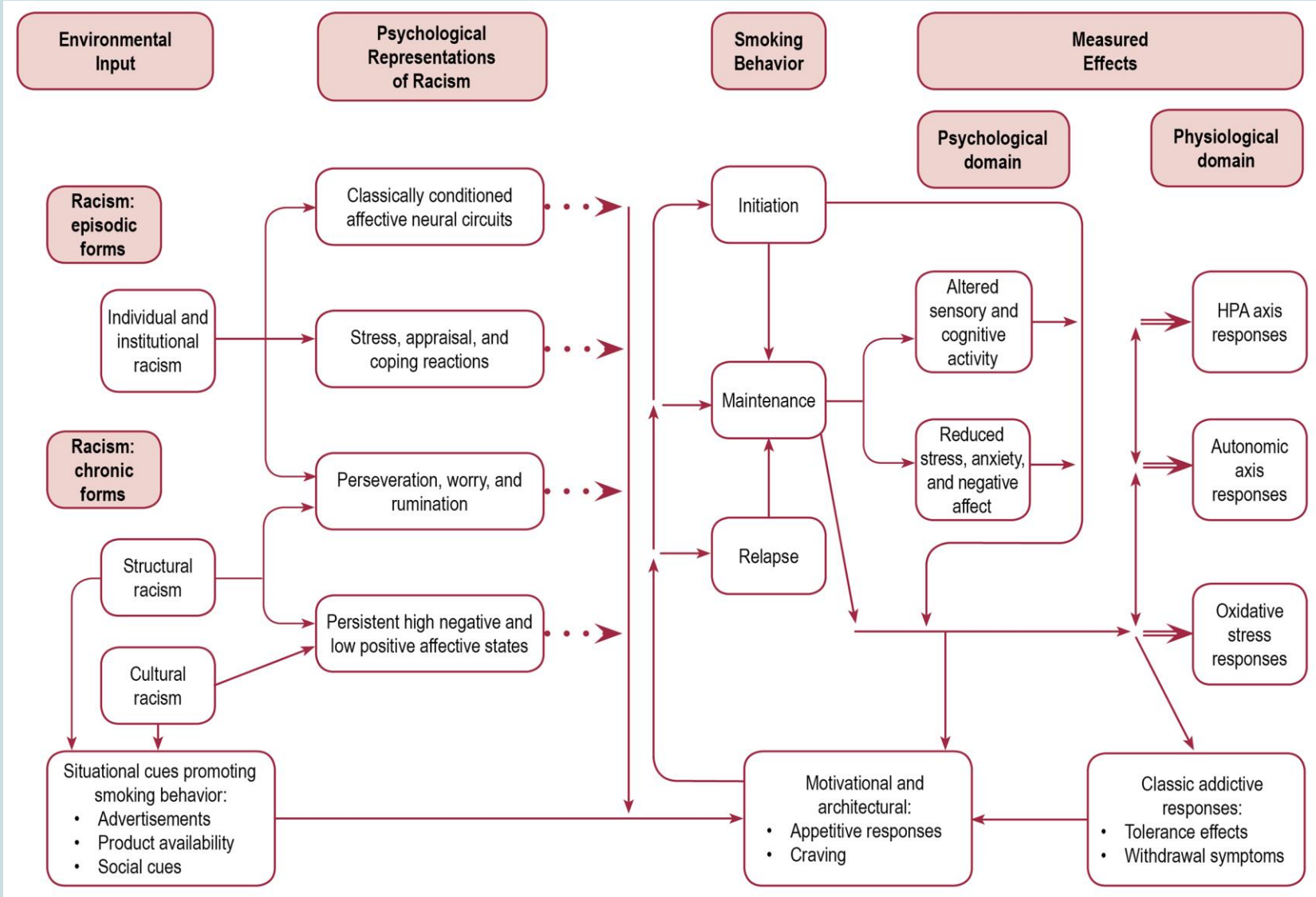
depressive symptoms, which were associated with current smoking. Consistent with the transactional model of stress,<sup>95</sup> this study suggests that individual appraisals of discrimination as stressful may in turn increase smoking risk. Using data from the Reactions to Race component of the 2004–2008 Behavioral Risk Factor Surveillance System (BRFSS), Purnell and colleagues<sup>96</sup> concluded that, across racial and ethnic groups, perceptions of discrimination increased the likelihood of current smoking, a relationship that was mediated by psychological distress. The existing research indicates that cessation and relapse prevention interventions should take into account reactions to perceived discrimination and provide adaptive coping strategies. A description of the existing literature on the relationship between racial discrimination and smoking is provided in Box 5.1.

### Box 5.1: Psychological, Biological, and Environmental Effects of Racism on Smoking Behavior

The conceptual model in the figure that follows is based on the existing literature analyzing the potential relationship between smoking and racism experienced by African Americans. This model depicts the potential influence of a number of factors on smoking and health. The figure shows that smoking is influenced by the addictive properties of nicotine and its psychological effects on emotions and cognition, as well as by environmental cues. Racism contributes to a portion of the affective and cognitive processes that smoking may impact. In its chronic forms, racism through environmental cues may encourage smoking more directly. Other links on the figure connect smoking to the mitigation of negative affective states induced by racism and to the enhancement of cognitive acuity that is required by racism. Racism and smoking traverse a second common pathway illustrating their potential shared physiological impact. Double-lined arrows on the right side of the figure mark paths where smoking and racism bring about significant physiological reactions that may develop into disease states.

Some components of the pathways would benefit from further investigation. For example, the underlying neural mechanisms through which smoking and racism affect particular physiological systems are important to explore. Much is known of the neural circuits activated by nicotine when psychological tasks are performed, but little is known about how the myriad forms of racism impact the central nervous system. Further, studies are needed to determine the conditions or individuals in which the acute physiological changes associated with smoking and racism are likely to progress to chronic levels, and eventually to disease processes.

### The Converging Paths of Racism and Smoking



## Racism, Discrimination, and Tobacco Use

Accumulating evidence indicates that racism and discrimination are associated with smoking status (Table 5.2). This section examines the relationship between racial discrimination and smoking status among racial/ethnic and LGBT groups. Landrine and Klonoff<sup>35</sup> developed the Schedule of Racist Events, a self-report inventory of the frequency of lifetime and past-year racism and discrimination. This measure is correlated strongly with smoking and psychological distress. (Note: The literature search did not identify any studies examining the relationship between racial/ethnic discrimination and smoking for American Indian/Alaska Native groups or for Native Hawaiians/Other Pacific Islanders.)

**Table 5.2 Summary of Studies on Racial Discrimination and Smoking Status Among Racial/Ethnic and LGBT Groups, 2000–2014**

Author (year)	Population(s)	Study design	Stress constructs	Findings
<b>African American (majority of sample)</b>				
Bennett et al. 2005 <sup>203</sup>	African Americans	Cross-sectional	Racial harassment	Positive association with daily smoking*
Corral and Landrine 2012 <sup>98</sup>	African Americans	Cross-sectional	Recent racial/ethnic discrimination	Positive association with current smoking*
Cuevas et al. 2014 <sup>94</sup>	African Americans	Cross-sectional	Daily unfair treatment/discrimination, global perceived stress	Association between discrimination and current smoking mediated by perceived stress*
Fernander et al. 2007 <sup>53</sup>	African American women	Cross-sectional	Race-related stress	Race-related events positively associated with global stress, which was, in turn, related to smoking*
Greene 2012 <sup>100</sup>	African Americans	Cross-sectional, nationally representative survey	Perceived discrimination	Positive association with smoking among men,* inversely related among women
Kwate et al. 2003 <sup>89</sup>	African American women	Cross-sectional	Past-year racism, lifetime racism	Positive associations with psychological distress*; past-year racism positively associated with number of cigarettes per day
Landrine and Klonoff 2000 <sup>93</sup>	African Americans	Cross-sectional	Racial discrimination	Positive associations with current smoking,* frequent (vs. infrequent) discrimination,* and severity of discrimination-related stress*
Landrine and Klonoff 2000 <sup>99</sup>	African Americans	Cross-sectional, random sampling	Racial discrimination, racial segregation	No association with smoking status; segregation positively associated with smoking prevalence*
<b>African American and other groups</b>				
Borrell et al. 2007 <sup>97</sup>	African Americans, whites	Prospective	Racial discrimination	Positive associations with current tobacco use among African Americans only*
Borrell et al. 2013 <sup>37</sup>	African Americans, whites	Prospective	Racial discrimination	Positively predicted smoking among African Americans and whites*

Table 5.2 continued

Author (year)	Population(s)	Study design	Stress constructs	Findings
Fernander et al. 2010 <sup>92</sup>	African American pregnant women	Cross-sectional	Race-related stress, institutional race-related stress	Overall frequency and negative perceptions of race-related stress positively associated with current smoking*; no association with institutional race-related stress
Kendzor et al. 2014 <sup>38</sup>	African Americans, Hispanics, and whites	Cross-sectional	Everyday discrimination	Positive associations with indicators of nicotine dependence,* particularly among Hispanics*
Nguyen et al. 2012 <sup>101</sup>	Low-income, pregnant African Americans and Hispanics	Longitudinal, prospective	Ethnic discrimination	High (vs. moderate) levels of discrimination positively associated with prenatal smoking among African American women*
Wiehe et al. 2010 <sup>105</sup>	African Americans and Hispanics, ages 12–19 years	Cross-sectional	Perceived discrimination	Positive association with current smoking among boys only*
<b>Non-African Americans</b>				
Todorova et al. 2010 <sup>102</sup>	Hispanics of Puerto Rican origin	Cross-sectional	Perceived discrimination, global perceived stress	Positive association with ever-smoking*; perceived stress not a mediator of discrimination–smoking association
Chae et al. 2008 <sup>106</sup>	Asian Americans	Cross-sectional	General unfair treatment, race/ethnicity specific discrimination	Unfair treatment positively associated with current smoking*; discrimination positively associated with current smoking,* moderated by ethnic identification*
Yoo et al. 2010 <sup>108</sup>	Asian Americans	Cross-sectional	Racial discrimination	Positive association with current smoking*
Kam et al. 2010 <sup>204</sup>	Hispanic youth, Mexican heritage	Cross-sectional	Perceived discrimination	Indirectly associated with substance use (cigarettes, alcohol, and marijuana composite) through increased acculturative stress*
Ornelas 2010 <sup>104</sup>	Hispanic immigrant men	Cross-sectional	Perceived ethnic discrimination	No association with current smoking
Purnell et al. 2012 <sup>96</sup>	U.S. multiethnic sample	Cross-sectional, nationally representative survey	Perceived discrimination	Positive association with current smoking,* mediated by psychological distress*
Tran et al. 2010 <sup>107</sup>	African-born blacks, Southeast Asians, Hispanics	Cross-sectional	Perceived discrimination	Positively associated with current smoking in full sample,* and among Southeast Asians*

Note: No studies were found for American Indian and Alaska Native groups, Native Hawaiians or Other Pacific Islanders, and LGBT groups.

\*Finding was statistically significant.

### *Race, Discrimination, and Smoking in African American Populations*

Research evidence demonstrates an association between racial discrimination and cigarette smoking among African Americans. This robust relationship has been found across sample types, including representative national surveys, community-recruited samples, and convenience samples recruited in medical settings. Data from the CARDIA study indicate that African Americans who had experienced at least three types of discrimination had greater odds of current tobacco use (adjusted odds ratio [aOR]

1.87; 95% CI 1.18–2.96) and previous tobacco use (aOR 2.28; 95% CI 1.19–4.36) than those who had not experienced discrimination.<sup>97</sup> In a separate study analyzing data from the CARDIA study independent of individual and neighborhood socioeconomic conditions and segregation, self-reported discrimination positively predicted smoking and alcohol use 8–15 years later.<sup>37</sup>

In a sample of 2,118 African American adults, Corral and Landrine<sup>98</sup> also found a positive association between racial discrimination and smoking (OR 1.33; 95% CI 1.04–1.67). Because smoking status is confounded with societal status indicators, it is important to determine the independent effect of racial discrimination. In one of the few studies to adjust for social status, racial discrimination was shown to be a stronger predictor of smoking among African Americans than social status variables.<sup>93</sup> Smoking rates were higher among participants who reported experiencing frequent (versus infrequent) discrimination (26.7% and 6.4%, respectively), and who appraised these experiences as extremely (versus mildly) distressing (42.2% and 20.8%, respectively).<sup>93</sup>

In contrast, another study by Landrine and Klonoff<sup>99</sup> did not find a relationship between racial discrimination and smoking, although smoking was more common among African Americans in highly segregated communities than in less segregated areas. Smoking intensity has also been positively linked to past-year racist experiences.<sup>89</sup> A study by Greene<sup>100</sup> considered gender differences in the relationship between racial discrimination and smoking. Using data from the National Survey of American Life on a representative sample of adult African Americans, this researcher concluded that perceived discrimination increased the likelihood of smoking among men but not women.<sup>100</sup>

Racial discrimination may also influence smoking during pregnancy. In a study of pregnant African American and Hispanic women, Nguyen and colleagues<sup>101</sup> found that African Americans were more likely to smoke while pregnant if they had experienced a high degree of discrimination compared with a moderate amount. A study by Fernander and colleagues<sup>92</sup> with a sample of pregnant African American women found that the likelihood of current smoking was positively related to the emotional impact and frequency of race-related stress. In contrast, smoking status is not related to institutionalized racial discrimination (i.e., stress from policies and practices of an institution that have been intentionally based on the idea that some racial groups are superior to others).

### *Race, Discrimination, and Smoking in Hispanic Populations*

A few studies have assessed the health consequences of ethnic discrimination among Hispanic populations. Among middle-aged Puerto Ricans, ethnic discrimination has been positively associated with perceived stress, self-reported medical diagnoses, and lifetime smoking history.<sup>102</sup> Kendzor and colleagues<sup>103</sup> found that U.S. Hispanics are more likely than non-Hispanics to report experiences of perceived discrimination related to ethnicity and national origin. In a sample of African Americans, Hispanics, and whites, these investigators also found that discrimination in everyday life was most strongly related to nicotine dependence among Hispanics. Some research, however, has not observed a relationship between perceived racial discrimination and smoking among Hispanics.<sup>104</sup>

Racial harassment has been associated with smoking risk among African American and Hispanic adolescents. Wiehe and colleagues<sup>105</sup> found that perceived racial/ethnic discrimination was associated with smoking among boys, particularly when the discrimination occurred in shops or through interactions with police. One study considering the role of discrimination and smoking cessation among Latinos over a 6.5-month period found that the frequency of major discriminatory events was inversely

associated with cessation.<sup>38</sup> No other studies have focused on specific stages of the tobacco use continuum.

### *Race, Discrimination, and Smoking in Asian American Populations*

Little research has been conducted on the association between racial discrimination and smoking among Asian Americans. Chae and colleagues<sup>106</sup> demonstrated a positive correlation between unfair treatment or discrimination and current smoking among Asian Americans. Strong ethnic identity emerged as a protective factor for people with more discrimination experiences. Tran and colleagues<sup>107</sup> assessed perceived discrimination in a multiethnic sample and found a positive association between discrimination and current smoking among Southeast Asian immigrants to the United States. Being treated as a foreigner was positively correlated with tobacco use among Asian Americans, according to a study by Yoo and colleagues.<sup>108</sup>

### *Race, Discrimination, and Smoking in LGBT Populations*

Smoking prevalence is higher among LGBT individuals than among heterosexuals.<sup>80,109</sup> The LGBT population experiences uniquely stressful circumstances, including more frequent discrimination compared to heterosexuals,<sup>109</sup> but little research has specifically investigated the role of sexual identity–based discrimination on smoking behavior. Johns and colleagues<sup>81</sup> found that discrimination was unrelated to smoking status, yet discriminatory events increased the likelihood of daily smoking versus smoking on some days. Physical violence toward LGBT individuals is a form of discrimination and increases the likelihood of current smoking.<sup>110</sup> Research has not considered how the intersection of race/ethnicity and LGBT identification influences the stress–smoking association and TRHD.

## **Psychological Disorders and TRHD**

This section examines other psychosocial factors, such as psychological disorders and trauma, and their effect on TRHD.

### **Psychological Disorders and Minority Racial/Ethnic and LGBT Groups**

The links between a variety of psychological disorders and tobacco use are well established at each point along the tobacco use continuum for both adolescents and adults,<sup>43,111–115</sup> but there is less evidence on their association with TRHD. Prevalence of smoking and higher rates of smoking are associated with psychological disorders such as depressed mood, anxiety disorders, PTSD, attention deficit disorder, alcohol disorders, and disruptive behavior disorders. Lifetime psychopathology symptoms are associated with smoking initiation (e.g., Rohde et al. 2003<sup>116</sup>), and individuals with psychiatric symptoms and disorders are more likely to proceed along the tobacco use uptake continuum<sup>117,118</sup> and become nicotine dependent.<sup>119</sup> Symptoms of psychopathology are also correlated with difficulties in quitting, particularly in smokers with comorbid depressive symptoms or disorders or comorbid substance use.<sup>120–123</sup>

To understand whether the presence of these disorders plays a role in TRHD, several questions need to be addressed: Do disadvantaged groups vary in the prevalence of these disorders in a way that might explain behavioral differences in tobacco use patterns or in health outcomes? Might the presence of these disorders in disadvantaged groups impair access to treatment for smoking? Are disadvantaged groups differentially hindered by psychological disorders or symptoms (e.g., depression or depressive



symptoms) in their attempts to stop smoking? Are some disorders more likely to bring about a cascade of negative physiological effects?

Patterns of psychiatric morbidity across racial/ethnic groups have been examined with appropriate controls and samples. Using data from the National Comorbidity Study, along with appropriate consideration of the role of SES, Breslau and colleagues<sup>124</sup> found that both Hispanics and African Americans have a lower lifetime risk of psychiatric disorders than non-Hispanic whites, but those who do have a disorder tend to have more persistent illnesses. Williams and colleagues<sup>125</sup> also found that chronicity of major depressive disorder is higher for both African Americans and Caribbean blacks compared to whites, suggesting that the burden of mental disorders may be higher among blacks than whites in the United States.

Using data from the U.S. National Epidemiologic Survey on Alcohol and Related Conditions (NESARC), two studies<sup>126,127</sup> also found that the prevalence of mental health disorders varies significantly by racial/ethnic group, as do patterns of comorbidities, although these differences did not necessarily replicate those found by Breslau and colleagues.<sup>124</sup> Most notably, Huang and colleagues<sup>126</sup> found significantly greater rates of alcohol use disorders, drug use disorders, mood disorders, anxiety disorders, and personality disorders among American Indians compared with other race/ethnic groups in the U.S. population. Asian Americans had the lowest rates of mood, anxiety, and substance use disorders. Disparities in comorbidities do not necessarily mirror disparities in tobacco use prevalence rates across racial/ethnic groups, further complicating the picture of understanding racial/ethnic patterns of disorders.<sup>126</sup>

It is also important to note that large epidemiological surveys of mental health disorders rarely include formal psychiatric diagnostic interviews, but tend to reflect a combination of symptoms that map onto diagnostic criteria that together are highly suggestive of formal disorders; as such, they are often labeled as the disorder in the investigations addressing psychological disorders or symptomatology and smoking. It may be more appropriate to consider that the literature reflects links between the tobacco use continuum and psychological symptoms rather formal diagnostic assessments.

The finding that African Americans have lower rates of depression than whites may appear contrary to expectations, given their higher rate of exposure to stressful events and discrimination. One potential explanation for this discrepancy is that blacks engage in unhealthy behaviors, such as tobacco or alcohol use, to cope with stress<sup>128</sup> rather than experience depression. Keyes and colleagues<sup>129</sup> tested the hypothesis that the black–white depression paradox is due to the protective effects of unhealthy behaviors (alcohol consumption, smoking, and high body mass index) at high stress levels. Using longitudinal, nationally representative data from NESARC, these researchers found that African Americans were less likely than whites to smoke cigarettes at low, moderate, or high levels of stress, and that the stress pathways to depression did not operate differentially by race.

The evidence for LGBT groups having higher rates of mental disorders is much stronger and more consistent than that for racial/ethnic minority groups. In a meta-analysis, King and colleagues<sup>130</sup> found that lesbian, gay, and bisexual people are at high risk of mental disorders, suicidal ideation, substance misuse, and self-harm than heterosexuals. Similarly, a study of a community sample of 246 LGBT youths ages 16–20 years old, found that one-third of the youth met criteria for any mental disorder, a higher prevalence than that found among youths in national samples.<sup>131</sup>

Persistence of mental health disorders may place individuals at greater risk for continued smoking and increased difficulty quitting. Studies examining relationships between mental disorders, tobacco use, and cessation for specific population groups tend to echo the general finding that mental illnesses may be a hindrance to cessation, but there is a relative paucity of studies specifically examining how mental disorders influence smoking cessation among minorities or disadvantaged groups. Hickman and colleagues,<sup>132</sup> analyzing data from a nationally representative sample of black adults participating in the National Survey of American Life, found recent mental illness (past year and past month) was associated with lower odds of cessation. Castro and colleagues<sup>133</sup> also found that depressive symptoms predicted lower cessation rates for both whites and African Americans, but there was no relationship between depression and cessation for Latinos.

One way in which mental disorders might influence TRHD is through access to care. Racial/ethnic minority groups have more barriers to mental health care than non-minority groups do<sup>134,135</sup> and are more likely to underuse mental health services.<sup>136,137</sup> Disparities in mental health care may leave minority groups more vulnerable to tobacco use as a way of coping with mental health symptoms and may also translate into barriers to treatment for smoking cessation.

### Trauma and Post-Traumatic Stress Disorder in Minority Racial/Ethnic and LGBT Groups

Studies have investigated the relationship between exposure to trauma and other adverse life events and TRHD. PTSD is a psychiatric condition characterized by exposure to trauma (e.g., events such as natural disasters, war, violence, and abuse) and subsequent symptoms of re-experiencing, avoidance, emotional numbing, and physiological hyperarousal.<sup>138</sup> Whether defined by race, ethnicity, sexual orientation, or SES, a person's demographic status may be an important factor in the risk of experiencing exposure to trauma and PTSD, and together, these factors may be associated with TRHD. Racial minority status is associated with higher rates of exposure to certain types of traumatic events, such as community violence<sup>139</sup> and violence in the household.<sup>140</sup> A meta-analysis across racial groups found that low SES, but not racial/ethnic minority status, was associated with increased rates of PTSD.<sup>141</sup> Table 5.3 summarizes some of the research conducted in this area.

**Table 5.3 Studies Examining Stress/Trauma and Tobacco Use Among Racial/Ethnic Groups, 2003–2012**

Author (year)	Population(s)	Study design	Stress construct	Findings
Beaudoin 2011 <sup>163</sup>	African Americans	Cross-sectional	PTSD	Positive association with current smoking*
Dickerson et al. 2009 <sup>157</sup>	American Indians	Cross-sectional	PTSD	Positive association with lifetime nicotine dependence*
Flory et al. 2009 <sup>162</sup>	African Americans, whites, others	Cross-sectional	Psychosocial stress, PTSD symptoms	Stress positively associated with current smoking*; nicotine dependence positively associated with PTSD symptoms*
Jessup et al. 2012 <sup>151</sup>	Women of African American, American Indian, Asian/Pacific Islander, Hispanic, white, and mixed ethnicity	Cross-sectional	PTSD	Positive association with current smoking*

Table 5.3 continued

Author (year)	Population(s)	Study design	Stress construct	Findings
Lopez et al. 2011 <sup>154</sup>	Pregnant women, African Americans	Cross-sectional	Lifetime and current PTSD symptoms and diagnosis	Positive association with current smoking*
Sawchuk et al. 2012 <sup>205</sup>	American Indians	Descriptive, cross-sectional	PTSD	Positive association with lifetime smokeless tobacco use among Northern Plains vs. Southwest Tribal members*
Stephens et al. 2010 <sup>155</sup>	African Americans, whites, American Indians, Asian/Pacific Islanders, Hispanics, others	Cross-sectional	PTSD symptoms	No association with tobacco use in full sample; positive association with tobacco use among African Americans, American Indians, and Asian Americans*
Weaver and Etzel 2003 <sup>159</sup>	African Americans, whites, Hispanics, others	Cross-sectional	PTSD, trauma severity	No association with smoking status; positive association with nicotine dependence*

Note: PTSD = post-traumatic stress disorder.

\*Finding was statistically significant.

Exposure to traumatic events in childhood may differentially affect minority youth and lead to early tobacco use. A study using data from the National Survey of Adolescents found that African American and Hispanic youth were at greater risk for developing PTSD than white youth.<sup>142</sup> In a 12-year longitudinal study following 585 children (82% European American, 16% African American, 2% other) from pre-kindergarten to grade 11, childhood physical maltreatment (e.g., physical abuse) was associated with more school absences, suspensions, and behavioral problems.<sup>143</sup> The authors note that their study provides support for the persistent and long-term effects of early physical maltreatment. Although this study did not measure tobacco use as an individual outcome variable, or find evidence for differential effects of trauma on substance abuse more generally, the results suggest that early trauma exposure could lead to TRHD by impacting some populations more than others. In another study, which focused on a predominantly (85%) African American sample of adolescent girls, both the number of lifetime traumas and levels of PTSD symptoms independently predicted current smoking status, such that a greater number of traumas and/or more severe PTSD were associated with a greater likelihood of smoking.<sup>144</sup>

In a comprehensive study examining the relationship between adverse childhood experiences and different aspects of smoking behavior along the tobacco use continuum, and adjusting for age, sex, race, and education, Anda and colleagues<sup>145</sup> found a strong and cumulative relationship between adverse childhood experiences and smoking behavior. Compared with adults who reported no adverse childhood experiences, adults who reported five or more categories of adverse events (emotional abuse; physical abuse; sexual abuse; a battered mother; parental separation or divorce; growing up with a substance-abusing household member, mentally ill household member, or incarcerated household member) had significantly higher risks of early smoking initiation (OR 5.4; 95% CI 4.1–7.1), ever smoking (OR 3.1; 95% CI 2.6–3.8), current smoking (OR 2.1; 95% CI 1.6–2.7), and heavy smoking (OR 2.8; 95% CI 1.9–4.2).<sup>145</sup>

Two other meta-analyses have also found that prevalence rates of tobacco use were lowest among people with no trauma exposure; elevated among persons with trauma exposure but without PTSD; and highest among individuals with both trauma exposure and PTSD.<sup>146,147</sup> Moreover, trauma and PTSD were most clearly implicated in the initiation and continuation—as opposed to cessation—of tobacco use.<sup>146</sup> Roberts and colleagues<sup>148</sup> examined the relation between self-reported exposure to various types of trauma and smoking behaviors in the National Longitudinal Study of Adolescent to Adult Health (Add Health study), a population-based, longitudinal study of more than 15,000 adolescents followed into young adulthood. The study found that reported past-year exposure to trauma was associated with up to a two-fold risk of regular smoking in the past year (exposure to physical assault: OR 1.91; 95% CI 1.25–2.92; exposure to interpersonal violence: OR 1.46; 95% CI 1.01–1.07).<sup>148</sup>

Additional insights come from studies exploring smoking behaviors after trauma exposure. In a large sample of New York City public high school students, black and Hispanic students were less likely than whites to report increases in smoking 6 months following the World Trade Center attacks in September 2001.<sup>149</sup> Although demonstrating that post-trauma tobacco use trajectories may differ across racial groups, this study did not utilize a non-trauma-exposed control group. Among a sample of sexual assault victims, racial minority adults were less likely to have a heavy and increasing smoking trajectory compared to whites,<sup>150</sup> but this study also lacked a non-traumatized control group, so the changes in behavior may not necessarily reflect responses to trauma. Despite methodological limitations, these studies of changes in tobacco use behaviors can provide important information about longitudinal changes in smoking in response to traumatic events.

In a study of the relationship between smoking and PTSD in an ethnically diverse sample of women recruited from health clinics, mental health agencies, substance abuse treatment centers, and senior communities, Jessup and colleagues<sup>151</sup> found smoking rates of 58% among African Americans, 56% among American Indians, and 53% among bisexual women. Smoking was positively related to PTSD, although the interaction with race/ethnicity was not reported. In a study of residents of Central Harlem in New York City, current smokers (87% black; 55% female) reported having experienced greater lifetime exposure to traumatic events than nonsmokers.<sup>152</sup> Amos and colleagues<sup>153</sup> studied a sample of African American college males and found that those who reported past sexual abuse in or around campus were more likely to report tobacco use in the past 30 days. Lopez and colleagues<sup>154</sup> reported that African American pregnant women who smoked were significantly more likely to have a current or past PTSD diagnosis than women who did not smoke and were not African American. Stephens and colleagues<sup>155</sup> concluded that tobacco use was not an independent predictor of PTSD symptoms in acutely injured trauma center inpatients, but African American and Native American trauma survivors had a higher prevalence of tobacco use than whites.

In a sample of Native American adults, rates of current smoking were higher among individuals with PTSD than those without it.<sup>156</sup> Dickerson and colleagues<sup>157</sup> found a positive relationship between lifetime nicotine dependence and PTSD among American Indian male veterans. Importantly, when comparing rates of smoking between trauma/PTSD groups, these studies did not control for other risk behaviors: They did not examine whether trauma or PTSD was associated with increases in other health risk behaviors, such as other substance or alcohol use, in addition to smoking.

A relationship between trauma and current smoking has also been found for LGBT groups. Gay, lesbian, and bisexual young adults from a large epidemiological sample who reported having been victims of violence were more likely to smoke than those who reported they had not been victimized.<sup>110</sup>

Victimization was also associated with smoking among heterosexuals, indicating that the relationship between violence exposure and smoking was not specific to LGBT groups. However, compared to the heterosexual participants, LGBT individuals reported higher levels of both smoking and victimization. The authors conclude that “risks for elevated smoking may stem from stressful events like discrimination and victimization, which sexual minority populations experience at disparately higher rates their heterosexual peers. As found in other studies, it is not simply being gay, but the stressful events...and resulting emotional or psychological distress that can be predictive of cigarette smoking.”<sup>110,p.1291-92</sup>

In addition, associations between trauma or PTSD and level of nicotine dependence have been found. In a community sample of adult smokers (over half of whom were African American), Thorndike and colleagues<sup>158</sup> found that levels of nicotine dependence were positively associated with levels of PTSD symptoms among men but not among women. One limitation of this study is that it did not examine the relationship by race. These findings that report differences by sex contrast with previous work that showed that both violence exposure and PTSD symptoms were positively associated with nicotine dependence among a predominantly African American sample of severely battered female smokers.<sup>159</sup> Thorndike and colleagues<sup>158</sup> noted that their own sample might have experienced less severe trauma, possibly showing a weaker relationship between trauma/PTSD and smoking. This finding highlights the importance of considering trauma severity when making comparisons between traumatized and non-traumatized groups.

Very few studies have examined the relationship between trauma/PTSD and smoking cessation among minority groups. The pattern of PTSD symptoms and their recurrent nature may, however, place newly abstinent smokers at greater risk for relapse. Zvolensky and colleagues<sup>160</sup> found that smokers with a history of PTSD had a higher risk of early relapse than smokers without psychiatric problems, but this study’s sample was too small and non-diverse to lead to any conclusions about whether the PTSD–relapse risk is similar in different minority groups.

Studies of the relationship between PTSD and tobacco use might benefit from an examination of types of PTSD symptoms. Among a sample of 66 adult Bosnian war refugees presenting for primary health care services, current smokers reported higher levels of PTSD hyperarousal, but not re-experiencing, avoidance, or numbing.<sup>161</sup> Hyperarousal symptoms were also associated with greater nicotine dependence in this sample.

Flory and colleagues<sup>162</sup> found a high rate of smoking (53%) (as well as high rates of alcohol consumption and hazardous/harmful alcohol use) among adult survivors of Hurricane Katrina. Current smoking was associated with psychosocial stressors, and nicotine dependence was associated with PTSD symptoms. Most participants in the study were African American (57%), but analyses by race/ethnic group were not reported. In a study examining post-disaster trends in alcohol and tobacco use among African Americans in New Orleans, Beaudoin<sup>163</sup> found comparable levels of cigarette smoking before and after Hurricane Katrina; however, logistic regression analysis found that PTSD was significantly associated with cigarette smoking (OR 1.78; 95% CI 1.05–3.44)

The existing literature suggests that PTSD is related to the prevalence of smoking, smoking intensity, and dependence among racially/ethnically diverse smokers. No studies on this subject have included representative proportions of Hispanics, Asian Americans, or LGBT groups, and none have examined differences in smoking across racial/ethnic groups. Because these traumatic processes are associated

with socioeconomic indicators—due to displacement, for example—additional empirical studies are needed to examine how these factors may contribute to TRHD.

## Examining Specific Psychological Stress, Trauma, and Smoking: Women and Intimate Partner Violence

The final section in this chapter focuses on a specific category of stress, trauma, and violence: intimate partner violence (IPV) experienced by women. The Centers for Disease Control and Prevention (CDC) defines IPV as “physical violence, sexual violence, stalking and psychological aggression (including coercive tactics) by a current or former intimate partner,” which can include one’s spouse or former spouse, current or former partner, boyfriend, or girlfriend, or dating partner, whether heterosexual, lesbian, bisexual, gay, or transgendered.<sup>164,p.11</sup> The United Nations’ 1993 Declaration on the Elimination of Violence Against Women defines violence against women generally as “any act of gender-based violence that results in, or is likely to result in, physical, sexual or psychological harm or suffering to women, including threats of such acts, coercion or arbitrary deprivation of liberty, whether occurring in public or private life.”<sup>165,Article 1</sup> Article 2 of this declaration refers more specifically to IPV, stating that “violence against women shall be understood to encompass . . . physical, sexual and psychological violence occurring in the family.”<sup>165,Article 2</sup>

This section describes the relationship between IPV and the tobacco use continuum, using evidence from the literature. Types of IPV are described in Box 5.2. Although both men and women can experience IPV, this chapter focuses on women because they are the subject of most of the available literature on this topic.

### Box 5.2: Four Types of Intimate Partner Violence

There are four main types of IPV: physical violence, psychological/emotional violence, sexual violence, and stalking.<sup>164</sup>

*Physical violence* is the intentional use of physical force with the potential for causing death, disability, injury, or harm. Physical violence includes, but is not limited to, scratching, pushing, shoving, throwing, grabbing, biting, choking, shaking, slapping, punching, burning, use of a weapon, and use of restraints or one’s body, size, or strength against another person.

*Psychological/emotional violence* involves trauma to the victim caused by acts, threats of acts, or coercive tactics. Psychological/emotional abuse can include, but is not limited to, humiliating the victim, controlling what the victim can and cannot do, withholding information from the victim, deliberately acting to make the victim feel diminished or embarrassed, isolating the victim from friends and family, denying the victim access to money or other basic resources, and threats of physical or sexual violence (using words, gestures, or weapons to communicate the intent to cause physical harm, injury, or death).

*Sexual violence* is divided into three categories: (1) use of physical force to compel a person to engage in a sexual act against his or her will, whether or not the act is completed; (2) an attempted or completed sex act involving a person who is unable to understand the nature of the act, to decline participation, or to communicate unwillingness to engage in the sexual act because of intimidation or pressure, illness, disability, or the influence of alcohol or other drugs; or (3) abusive sexual contact, including unwanted touching or fondling.

*Stalking* generally refers to harassing or threatening behavior that an individual engages in repeatedly, such as following a person, appearing at the person's home or place of business, making harassing phone calls, leaving written messages or objects, or vandalizing personal property.<sup>206</sup>

Estimates of the prevalence of IPV in the United States vary significantly, in part because of under-reporting and differences in definitions and data collection methods. The CDC estimates that as of 2010, more than 35% of women and 28% of men have experienced physical violence, sexual violence, or stalking by an intimate partner at some time in their lives.<sup>166</sup> Estimates from the national- and state-level National Intimate Partner and Sexual Violence Survey (NISVS) for different types of IPV (including psychological/emotional violence) are presented in Table 5.4. For women, estimates of the prevalence of types of IPV range from 6% to 64%, depending on the specific population; data from the NISVS suggest that individuals who are multiracial or American Indian/Alaska Native are more likely to suffer from multiple forms of IPV than whites, blacks, Hispanics, or Asian or Pacific Islander populations.<sup>167</sup> Approximately half of the women who experience IPV are physically injured by their partners, and most sustain multiple injuries.<sup>168</sup>

**Table 5.4 Weighted Prevalence of Type of Intimate Partner Violence for Men and Women During Their Lifetimes and in Past 12 Months, 2011**

Type of IPV	Women		Men	
	Lifetime (%, 95% CI)	Past 12 months (%, 95% CI)	Lifetime (%, 95% CI)	Past 12 months (%, 95% CI)
Physical violence	31.5 (29.9–33.2)	4.0 (3.2–4.8)	27.5 (25.8–29.3)	4.8 (4.0–5.8)
Psychological/emotional violence	47.1 (45.3–48.8)	14.2 (12.9–15.5)	46.5 (44.6–48.4)	18.0 (16.5–19.6)
Sexual violence (not including rape)	15.8 (14.6–17.1)	2.1 (1.6–2.6)	9.5 (8.4–10.8)	2.1 (1.7–2.7)
Sexual violence (rape only)	8.8 (7.8–9.8)	0.8 (0.5–1.2)	0.5 (0.3–0.8)	N/A
Stalking	9.2 (8.2–10.3)	2.4 (1.9–3.0)	2.5 (1.9–3.3)	0.8 (0.6–1.2)

Notes: IPV = Intimate partner violence. CI = Confidence interval. N/A = Not applicable.

Source: Breiding et al. 2014.<sup>167</sup>

IPV has been found to occur in all regions of the world among all socioeconomic, religious, and cultural groups.<sup>169</sup> In a 10-country study of women's health and domestic violence, between 15% and 71% of women reported experiencing physical or sexual violence by a partner.<sup>170</sup> Justifications for IPV are similar around the world, and include disobeying or arguing with the man, not being a good wife (not caring adequately for him, the children, or the home; refusing sex), and suspected infidelity. While IPV is a universal phenomenon, women may be more vulnerable to IPV in cultures with social norms that enforce gender roles, particularly male dominance over women, and where inequalities between men and women are pronounced.<sup>171</sup>

Smoking and smoking-attributable disease rates are lower among women than men, but women more often experience IPV. As described in chapter 2, although the overall prevalence of smoking among women in 2015 was 13.6%, prevalence varied by race and ethnicity: 24.0% of American Indian/Alaskan Natives, 16.0% of whites, 13.3% of African Americans, 7.1% of Hispanics, and 2.6% of Asians.<sup>172</sup> In an

analysis of data from the 1999 Rhode Island BRFSS, women who reported having experienced IPV had higher rates of cigarette smoking than those who did not report having experienced IPV. The study authors note that the cross-sectional design of their study did not allow for causality to be inferred.<sup>173</sup>

Significant evidence has demonstrated that IPV poses a serious threat to public health, with impacts reaching beyond the initial occurrence. Women who have been victims of IPV report lower quality of life in terms of their mental and physical health. They have increased rates of stress compared with women who have not experienced violence; studies have suggested that IPV should be treated as a chronic disease.<sup>174,175</sup>

Research has linked the high levels of stress by women who have experienced IPV to increased rates of substance abuse.<sup>174,176</sup> Women who have experienced psychological, physical, or sexual abuse are consistently more likely than non-abused women to smoke.<sup>177,178</sup> Researchers have also suggested that smoking is used as a coping mechanism, albeit maladaptive, for stress associated with IPV, relationship distress, and traumatic events.<sup>174,179,180</sup>

IPV has the potential to interfere with women’s efforts to stop smoking. In general, research has found that the health behaviors of romantic partners influence one another.<sup>181</sup> Systematic reviews acknowledge the potential importance of partner support for promoting smoking cessation,<sup>182,183</sup> but this line of inquiry does not appear to consider whether women are currently experiencing IPV. The relationship dynamics in couples with IPV may mean that traditional smoking cessation goals, such as establishing a smoke-free household or simply refusing to smoke with a partner, could lead to physical harm. These findings highlight the importance of understanding the relationship between tobacco use and IPV. Evidence on this relationship and how it affects subsequent health outcomes may be valuable when developing tobacco prevention and cessation interventions targeted toward women and others at risk of experiencing IPV. Additionally, women with a history of experiencing IPV or other trauma may require more-focused interventions and alternative coping resources and strategies to replace smoking.

To inform future research, a description of data sources that may be used to explore the relationship between IPV, the tobacco use continuum, and TRHD is provided in Table 5.5.

**Table 5.5 Data Sources on Intimate Partner Violence and Smoking**

Data source (sponsoring organization)	Focus of survey	Questions on IPV	Questions on smoking status
Behavioral Risk Factor Surveillance System (CDC) <a href="http://www.cdc.gov/brfss">http://www.cdc.gov/brfss</a>	Health conditions and risk behaviors in the United States	8-question module on sexual violence 7-question module on IPV	Tobacco and smoking cessation (since 2005) questions included annually
Pregnancy Risk Assessment Monitoring System (CDC) <a href="http://www.cdc.gov/prams">http://www.cdc.gov/prams</a>	U.S. state-specific, population-based data on maternal attitudes and experiences around pregnancy	Questions on physical abuse during and after pregnancy	Questions on tobacco use during pregnancy



Table 5.5 continued

Data source	Focus of survey	Questions on IPV	Questions on smoking status
Youth Risk Behavior Surveillance System (CDC) <a href="http://www.cdc.gov/HealthyYouth/yrbs/index.htm">http://www.cdc.gov/HealthyYouth/yrbs/index.htm</a>	Health risk behaviors that contribute to death and disability among middle and high school students in the United States	Questions around teen dating abuse 1) Have you ever been physically forced to have sexual intercourse when you did not want to? 2) During the past 12 months, how many times did someone you were dating or going out with physically hurt you on purpose? 3) During the past 12 months, how many times did someone you were dating or going out with force you to do sexual things that you did not want to do?	Includes eight questions on smoking behaviors including age of first smoke, smoking frequency, and quitting smoking
National Longitudinal Study of Adolescent to Adult Health NICHD <a href="http://www.cpc.unc.edu/projects/addhealth">http://www.cpc.unc.edu/projects/addhealth</a>	Causes of health-related behaviors of U.S. adolescents in grades 7–12 and the outcomes into young adulthood	Questions on IPV included during Wave 3	Includes nine questions on smoking behaviors including age at first cigarette, smoking frequency, quitting smoking, and peer smoking
Multi-Country Study on Women’s Health and Domestic Violence Against Women (WHO) <a href="http://www.who.int/gender/violence/who_multicountry_study/en">http://www.who.int/gender/violence/who_multicountry_study/en</a>	Information on IPV and its association with women’s physical, mental, sexual, and reproductive health in 10 countries	Detailed questions regarding IPV	Two questions on smoking, including current smoking behavior and lifetime smoking behavior

Notes: IPV = Intimate partner violence. CDC = Centers for Disease Control and Prevention. NICHD = National Institute of Child Health and Human Development. WHO = World Health Organization.

## Intimate Partner Violence and the Tobacco Use Continuum

### *Intimate Partner Violence and Current Smoking*

Although studies have examined smoking and IPV in different populations and with different measures, research has consistently found that adult women who have experienced psychological, physical, or sexual abuse were more likely to smoke than non-abused women.<sup>173,177,178,184–187</sup> Studies of the association between smoking and IPV in adolescents have produced inconsistent results.<sup>188–190</sup> Exner-Cortens and colleagues<sup>190</sup> did not identify an association between teen dating violence and smoking, while Silverman and colleagues<sup>189</sup> identified a strong association. Both studies relied on large national data sets.

In a meta-analysis of 31 peer-reviewed publications (with a total of 271,192 study participants, of whom 95% were women), Crane and colleagues<sup>174</sup> found that those who had experienced IPV were significantly more likely to smoke than those who had not ( $d = 0.41$ ; 95% CI 0.35–0.47). Moderators in this study included pregnancy status, relationship type, ethnicity, and SES. Previous studies have suggested that the association between IPV and smoking is stronger among pregnant women than in the non-pregnant IPV population; the meta-analysis detected a trend toward significance based on pregnancy status.<sup>174</sup> Crane and colleagues<sup>174</sup> found no significant differences in the strength of the victim–smoking relationship in regard to relationship type, SES, or ethnicity. Other studies found that

pregnant women who had experienced IPV (before and/or during pregnancy) were more likely to have smoked during their pregnancy than those who had not experienced IPV.<sup>191–193</sup>

A meta-analysis by Caleyachetty and colleagues<sup>194</sup> evaluated the degree of association between IPV and smoking using data on women of reproductive age (15–49 years;  $n = 231,892$ ) from the Demographic and Health Surveys administered in 29 low- and middle-income countries. Smoking rates in this population ranged from 0.1% to 16.7%, with a rate higher than 5% in 31% of the countries surveyed. Domestic violence prevalence ranged from 8.7% to 62.5%; the rate exceeded 20% in 62% of the surveyed countries. Just under half of the countries involved in the study were found to have a statistically significant association between exposure to IPV and smoking after controlling for age, education, occupation, household wealth, religion, and pregnancy status. When the data were pooled across countries, the relationship between IPV and current smoking was significant (aOR 1.58; 95% CI 1.38–1.79); this association was found to be moderately consistent across the 29 countries involved in the study ( $I^2 = 55.3\%$ ,  $p < 0.0001$ ).<sup>194</sup>

Several other notable studies that addressed the IPV–smoking association were not included in the 2013 meta-analysis by Crane and colleagues. Gerber and colleagues<sup>185</sup> looked at the rates of IPV among smokers and nonsmokers in the Boston area. This cross-sectional study surveyed 2,386 women in eight health care settings and found that (1) women who reported no smoking or drinking had a 10% probability of having experienced IPV in the previous year and a 30% probability of having experienced IPV in their lifetimes; (2) women who reported smoking had a 14% past-year probability and a 49% lifetime probability; and (3) women who reported both smoking and drinking had a past-year probability of 27% and a lifetime probability of 54%. These relationships were found to be statistically significant after adjusting for age, race, education, marital status, health care site, and depression.

Jun and colleagues<sup>184</sup> examined the relationship between IPV and smoking in the context of psychological abuse with or without the co-occurrence of physical and sexual abuse in a sample of nurses in the United States. Using data from the Nurses' Health Study II ( $n = 54,200$ ), these researchers found that women experiencing only psychological abuse were 33% more likely (95% CI 13%–57%) to smoke than non-abused women. Women who reported psychological abuse with a single occurrence of physical or sexual abuse were 50% more likely to be smokers (95% CI 30%–80%) than non-abused women, and those with repeat co-occurrences of physical or sexual abuse were found to be 90% more likely (95% CI 70%–230%) to be smokers.

The largest study (as of 2014) of the association between smoking and IPV analyzed data from the BRFSS on 42,566 women and 27,590 men.<sup>195</sup> Of women who had not experienced IPV, 14.9% were smokers (95% CI 14.1%–15.6%), whereas 33.8% of females who had experienced IPV reported smoking (95% CI 32.2%–35.4%). Among males, 19.9% of non-victims were smokers (95% CI 18.9%–20.9%); in contrast, 36.5% of those who experienced IPV were smokers (95% CI 33.8%–39.1%). After controlling for age, race/ethnicity, income, and education, women who had experienced IPV were found to be 2.3 times more likely to smoke (95% CI 2.07–2.54) than non-victims, and males who experienced IPV were 1.92 times more likely to be smokers (95% CI 1.66–2.23) than non-victims.

The previously mentioned study by Jessup and colleagues<sup>151</sup> found similar results. The 997 study participants included 322 smokers and 675 nonsmokers; 65.1% of the smokers had experienced IPV compared to 31.3% of the nonsmokers ( $p < 0.001$ ).

As of November 2014, only one longitudinal study has investigated teen dating violence victimization and adverse health outcomes, including smoking.<sup>190</sup> This is an important area of focus because studies of teen dating violence have found that 20% of teens report psychological violence victimization, and between 0.8% and 12% report any physical violence victimization.<sup>190,196–198</sup> Exner-Cortens and colleagues<sup>190</sup> analyzed data from the National Longitudinal Study of Adolescent Health on a population of 5,681 middle and high school students (ages 12–18) who completed three waves of surveys over an 8-year period. Controlling for sociodemographics, child maltreatment, and pubertal status, the study found students who reported teen dating violence victimization at wave 2 were more likely than non-victims to smoke when interviewed at wave 3 (aOR 1.53; 95% CI 1.13–2.06).

Additional evidence is available on the relationship between smoking and other psychosocial factors that can in turn be associated with IPV. For example, one study found that a cumulative psychosocial index, which included indicators related to family relationships, negative life events, financial stressors, and problematic alcohol use, had a significant relationship with likelihood of smoking in women in their 60s (aOR = 1.53; 95% CI 1.30–1.81).<sup>199</sup> Another study found an association between smoking rates among LGBT individuals and psychosocial factors such as perceived parent and partner support, psychological distress, and victimization related to LGBT lifestyle factors.<sup>200</sup>

Several studies have made recommendations about screening and interventions with the IPV population that could reduce future smoking-related illnesses.<sup>174,194</sup> It remains unclear whether IPV leads to stress and poor health outcomes such as smoking, or if high levels of stress could potentially trigger IPV.<sup>177</sup>

### *Intimate Partner Violence and Frequency and Intensity of Tobacco Use*

A 2011 study by Ashare and colleagues<sup>201</sup> examined the relationship of smoking and PTSD in individuals who had experienced IPV based on the theory that smoking rates among IPV victims would be higher because they would be self-medicating due to PTSD. These researchers followed a group of 83 women who had experienced IPV and found smoking expectancies and PTSD symptoms to be correlated with the number of cigarettes smoked per day by women in this group. No other studies that examined the relationship between IPV and smoking frequency and intensity were found in the published literature.

### *Intimate Partner Violence and Tobacco Cessation and Relapse*

Studies of an association between IPV and tobacco cessation and relapse are limited, and the researchers were unable to identify any peer-reviewed studies. Most studies that examined the association between IPV and tobacco use concluded by discussing the need to adapt tobacco cessation programs for this population. One study that used a convenience sample of women arrested for IPV perpetration found that 62% of the women smoked, and 65% of those expressed a desire to quit,<sup>202</sup> but there was no discussion of barriers to smoking cessation.

## **Chapter Summary**

This chapter reviews studies on the relationships between stress-related processes, psychological disorders, trauma, and intimate partner violence and how these are related to smoking and TRHD across racial/ethnic, gender, and sexual orientation groups.

Research on the effects of stress in other areas of health suggests that physiological indicators of stress may differ for African Americans compared with whites. However, no evidence links physiological processes, such as HPA axis and sympathetic responses, to TRHD, and no studies have specifically examined differences between smokers across racial/ethnic groups. Thus, the role of physiological stress in TRHD remains an empirical question.

The literature reviewed does offer evidence of an association between perceived stress and smoking in racial/ethnic and LGBT populations. Most of these studies involved low-income African Americans; the evidence is less clear for other racial/ethnic groups and those with better financial resources. The preponderance of the research on perceived stress and current smoking consistently demonstrates a positive association. A few studies also found a positive association between perceived stress and smoking intensity; one study found stress to be a factor in smoking relapse following a smoking cessation attempt.

The few studies that have examined stress–smoking relationships among Hispanics provide an indication of an association. Only one study focused on Native Americans/Alaska Natives. Studies of LGBT groups suggest that current smoking is positively related to stress involving sexual orientation, although the data about this population were limited.

The literature, although scant for several racial/ethnic groups, suggests that racism and discrimination play a role in tobacco smoking. As hypothesized earlier, discrimination is one of the factors that may increase the risk of unhealthy behaviors such as smoking, decrease the chances of quitting, and ultimately increase health risk. Studies of a potential association between racial discrimination and current smoking were primarily cross-sectional and focused on African Americans. The data indicate that perceived racial discrimination (recent and past), race-related stress, and daily hassles are associated with current smoking. Specifically, the risk of current smoking increases with racist and discriminatory experiences, and perceived stress may mediate the association between racial discrimination and smoking. Race-related distress may be a factor contributing to the higher rate of smoking initiation among African American adults compared with white adults. The few studies focused on Hispanics provide some evidence of an association between discrimination and smoking status, although more research is needed. The data are scant concerning Asian Americans, and no studies included samples of American Indians/Alaska Natives or examined the role of racial discrimination in relation to aspects of the tobacco use continuum other than current smoking.

The evidence suggests that blacks, Hispanics, and Asians have a lower prevalence of some psychological disorders, and that American Indians tend to have higher rates. Members of LGBT groups are at higher risk of psychological disorders, substance use disorders, suicide, and self-harm compared with heterosexuals.<sup>130</sup> Persistent psychological disorders may confer greater risk for continued smoking. Evidence for an association between psychological symptoms or disorders and tobacco use varies along the tobacco use continuum and by population. In general, there is strong evidence that tobacco use is associated with psychological symptoms (especially mood disorders and other substance use disorders) and influences all points along the tobacco use continuum, notably for escalation of use and failure to quit. However, this evidence is strongest and most consistent for whites, and less consistent for other racial/ethnic groups. The lack of consistency in findings on the relationship between tobacco use and psychological symptoms and disorders for other groups may be a function of smaller sample sizes and fewer longitudinal studies. An association between mood symptoms and tobacco use has good theoretical plausibility, given the mood management properties of nicotine. It is not yet clear whether

the associations between psychological symptoms related to mood disorders and tobacco use vary by race/ethnicity or other groups.

The association between trauma/PTSD and tobacco use has such a strong theoretical potential to explain disparities that it may be useful to consider trauma/PTSD separately from other psychological disorders. There is good evidence for a relationship between trauma/PTSD and tobacco use in minority samples, and some minority groups are more likely to be exposed to traumatic events, but the literature on trauma/PTSD and tobacco use in minority groups is relatively sparse and is primarily limited to cross-sectional studies. As a result, the available evidence does not extend far beyond the basic observation that trauma exposure or PTSD may contribute to TRHD. Although the general literature supports a causal relationship in which trauma/PTSD lead to tobacco use, this relationship has yet to be demonstrated across a variety of minority groups. Perhaps most importantly, few studies have examined minority group differences in the strength of the association between trauma/PTSD and smoking. Some minority groups are exposed to more traumatic experiences yet smoke at lower rates, and among these groups, trauma and PTSD may be less strongly associated with smoking. Protective factors related to minority status may buffer the relationship between trauma/PTSD and tobacco use. Nevertheless, the role of trauma/PTSD in TRHD will remain unclear until further studies examine these associations across minority groups.

An association between smoking and IPV against women is supported by the available evidence, but few studies have investigated the relationship between IPV and TRHD, and most have not analyzed differences by race/ethnicity and other factors. Almost all studies have focused on IPV broadly rather than how specific types might increase the risk of smoking; women frequently experience overlapping types of IPV (e.g., physical, sexual, psychological, stalking, and coercive control), and the combined effects of these experiences are difficult to measure and analyze in relation to smoking. Further, few studies have measured the duration and intensity of women's experience with IPV and their perceptions of its impact on their lives, or have looked for a dose–response relationship between IPV and adverse health outcomes. The literature review did not find information on interventions that considered IPV as a factor affecting smoking cessation. Understanding partner dynamics, including partner smoking behaviors, may be useful to helping women with histories of IPV quit smoking.

In conclusion, the existing evidence indicates that stress plays a role in current smoking and maintenance of smoking behavior. To the extent that stress processes are exacerbated in minority populations, the potential result is an increased risk of adverse health consequences. Cessation rates may be improved by interventions that include stress management techniques with demonstrated efficacy, and by acknowledging the stress-inducing structural barriers faced by these populations.

## Research Needs

This review identified significant gaps in the literature regarding the relationship of stress and TRHD in minority racial/ethnic, gender, and LGBT groups. The literature search conducted for this section found that most studies included different racial/ethnic groups in their samples but did not examine effects within specific groups. Few studies examined the relationship between stress, trauma, and TRHD among LGBT groups.

An improved understanding of potential links between stress, trauma, and psychological processes and the tobacco use continuum may provide more insight into TRHD. These relationships may not be

straightforward or direct, and the field would benefit from more specific attention to clarifying potential mechanisms that may differ by subpopulation. In addition, research should examine the implications of the relationships between stress, trauma, and psychological processes in order to improve tobacco control policies and practices aimed at reducing TRHD.

Links between psychosocial processes, tobacco use at all points along the continuum, and population differences may help explain TRHD. Understanding these links is challenging and requires clear, theoretically driven hypotheses, strong measurement of constructs, and large samples. To date, much of the evidence has been based on post hoc secondary analyses. It is important that considerations of population differences be built into study designs from the onset. Additionally, harmonizing variables and constructs across existing studies would allow samples to be pooled, resulting in more opportunities to explore potential explanations of population differences. Finally, involving key stakeholders, including representatives of diverse populations, in all stages of the research process, from conceptualization and measurement of constructs to interpretation of results, will enrich the understanding of TRHD.

More research is needed that focuses on stress processes in populations that experience disparities across the entire tobacco use continuum. The literature on sympathetic nervous system and HPA axis responses to stress among racial/ethnic and LGBT smokers is quite limited. For example, no published studies examine stress–response physiological patterns in diverse groups of smokers and report outcomes by group. Alterations in neural circuitry and attenuated responses to stress, acute and chronic nicotine exposure, and smoking cessation have implications for health and possibly TRHD. Existing research on these issues is limited to understanding relationships with smoking status (current smoking and, in some cases, past smoking). More research is needed about the impact of stress processes on smoking frequency, intensity, cessation, relapse, morbidity, and mortality across racial/ethnic and LGBT populations.

Increasing the understanding of mechanistic contributors, mediators, and moderators of the stress–smoking relationship is also important. Little is known about the factors that may explain the association between stress and current smoking in racial/ethnic minority populations. There is some suggestion that global and unique stressors are explanatory factors, and that perception of stress and acculturative stress also contribute to smoking behavior. However, theoretically grounded investigations with hypotheses based on established or new models are needed to explain how stress impacts tobacco use and TRHD. Many of the risk factors for increased stress, such as low SES and racial discrimination, are difficult to disentangle from one another.

To date, most studies of perceived racial discrimination and smoking have focused on African Americans. Future research should consider the impact of racism and discrimination on tobacco use across other racial/ethnic groups.

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