

Gender and racial/ethnic differences in tobacco-dependence treatment: a commentary and research recommendations

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The preparation of the Public Health Service Report, *Treating Tobacco Use and Dependence*, brought to light a substantial gap in the smoking cessation literature; there is little or no research evidence regarding the success of formal tobacco-dependence treatment specific to gender or racial/ethnic status. Of the 192 articles included in the meta-analyses of the evidence-based PHS Report, none included results based on racial/ethnic group and only four reported results by gender. This commentary identifies tobacco use as a problem that crosses gender and racial/ethnic boundaries, reviews reasons that the different genders or racial/ethnic groups might require different tobacco-dependence treatments, provides suggestive evidence that both gender and racial/ethnic status influence tobacco-dependence treatment efficacy, and recommends changes and directions for future clinical research that will address gender and racial/ethnicity effects.

Introduction

Do formal tobacco-dependence programs benefit men and women equally? Are they efficacious across racial/ethnic groups? How confident are we of our answers to these questions? How much do we really know? This commentary examines the extent of our knowledge about gender and racial/ethnic differences in response to formal tobacco-dependence treatments and our confidence in that knowledge.

The goals of this commentary are to: (1) establish that tobacco use is a problem that crosses gender and racial/ethnic boundaries; (2) review reasons that the two

genders or racial/ethnic groups might require different tobacco-dependence treatments; (3) review suggestive evidence that both gender and racial/ethnic statuses influence tobacco-dependence treatment efficacy; and (4) recommend changes and directions for future clinical research that will address gender and racial/ethnicity effects. It is important to note that when discussing gender throughout this commentary, we are referring to the conjoint construct of biological genotype as well as correlated social roles. In addition, this commentary is less concerned with epidemiological trends and data, and more concerned with what we know about the clinical trial success of tobacco-dependence treatments when they are used in different populations.

The Public Health Service Guideline

The catalyst that led us to examine the relations between the efficacy of tobacco-dependence treatments and gender and race/ethnicity was the June 2000 publication of the Public Health Service Clinical Practice Guideline, *Treating Tobacco Use and Dependence*. This evidence-based Guideline provides recommendations for the

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treatment of tobacco dependence that are based on meta-analysis and expert review of research findings. It is intended to be a comprehensive and authoritative guide to the treatment of tobacco dependence. However, during the development of the Guideline, the authors of this commentary, who were integrally involved in the development of the Guideline along with the Guideline Panel and Consortium Partners, identified substantial gaps in the research literature.

Guideline researchers reviewed nearly 6000 articles published between 1975 and 1999 in their effort to assess and document the efficacy of tobacco-dependence treatments. This survey of the extant research literature revealed 192 articles reporting clinical trials that met criteria for inclusion in the meta-analyses.¹ Guideline researchers conducted more than 50 separate meta-analyses to examine the data in these articles. The analyses addressed the efficacies of different pharmacotherapies, 11 types of counseling or behavioral therapies, counseling parameters such as intensity and number of counseling sessions, different types of clinicians, and more. Despite the apparent wealth of clinical trial data available, Guideline researchers were unable to conduct a meta-analysis to characterize the efficacy of even a *single* treatment with respect to gender or racial/ethnic status. Only four of the 192 studies available for meta-analysis reported abstinence results by gender and none of the 192 studies reported abstinence rates by racial/ethnic status. Although a growing number of studies address tobacco dependence in women and in certain racial/ethnic groups, these studies either did not pass screening criteria for Guideline meta-analysis or did not publish original data on tobacco cessation by the end date of the Guideline literature review.

Gender and race/ethnicity in the PHS Guideline

Differences in population-based prevalence rates, initiation rates, or population differences in motivational processes provide important information and are drawing increased attention (Perkins, Donny, & Caggiula, 1999; Perkins, 1996; USDHHS, 1998, 2001). However, factors that influence prevalence rates, or that affect the motivation to use tobacco, may be unrelated to the impact of a specific cessation treatment in a specific population. In order to assess accurately the efficacy of specific cessation treatments for different populations, one should turn to randomized clinical trials of cessation treatments, such as those utilized in the PHS Guideline meta-analyses. Unfortunately, clinical trial researchers have largely ignored demographic factors in their attempts to gauge tobacco-dependence treatment efficacy. This commentary will focus on two specific demographic factors, gender and race/ethnicity. Other demographic variables, such as socioeconomic status (SES) and ability to speak and understand English, are also likely to be related both to tobacco dependence and to the efficacy of tobacco-dependence treatments. As

with gender and racial/ethnic status, the paucity of research evidence prevented data analyses of these topics in the PHS Guideline project. However, it seems likely that these factors may themselves influence or moderate response to tobacco-dependence treatments. Moreover, it is important to note that some of the effects that we attribute to racial/ethnic differences could, in fact, be due, at least in part, to the correlation of such differences with English proficiency and SES.

Given the paucity of randomized controlled trial data addressing efficacies within specific demographic populations, the PHS Guideline chapter on Special Populations was based mainly on a review of relevant studies, and not on meta-analyses. As a result, the Guideline Panel recommended that ‘The same smoking cessation treatments are effective for both men and women. Therefore, except in the case of the pregnant smoker, the same interventions can be used with both men and women’ (Fiore *et al.*, 2000, p. 91). And ‘Smoking cessation treatments have been shown to be effective across different racial and ethnic minorities. Therefore, members of racial and ethnic minorities should be provided treatments shown to be effective in this guideline’ (Fiore *et al.*, 2000, p. 96). In essence, because most of the clinical trial study populations were heterogeneous, comprising both genders and diverse ethnicity, and because some clinical trials focused specifically on populations such as women or African-Americans, the Guideline Panel concluded that the recommended treatments are, in fact, efficacious in all groups. There were, however, no data directly bearing on *relative* efficacy rates for different racial/ethnic populations among the studies accepted for meta-analysis and only four studies that addressed relative efficacy rates for men vs. women. Acknowledging this, both the gender and racial/ethnic minority sections of the Guideline contain many suggestions for future research. Areas recommended for future research include: ‘the impact of gender-specific motives that may increase quit attempts and success (e.g., quitting to improve fertility and reproductive health, erectile dysfunction, pregnancy outcomes, physical appearance, and osteoporosis)’ (Fiore *et al.*, 2000, p. 92) and ‘the identification of the specific barriers or impediments to treatment or treatment success (e.g., SES, inadequate access to medical care), and the differential health effects related to smoking patterns for racial and ethnic minorities’ (Fiore *et al.*, 2000, p. 98). The hope expressed in the Guideline and in this commentary is that future clinical research will fill in the gaps and help identify clinical treatments that are likely to be most effective within gender and racial/ethnic groups.

Tobacco use and health risks

No gender or racial/ethnic group escapes smoking and its consequences. Women and racial/ethnic minorities make up a large proportion of the smokers in this country and a lack of information about tobacco-use treatments for

these populations could have great public health significance. In 1997, 22.3 million women were current smokers, constituting approximately half of the total smoking population (CDC, 1999). In addition, it has been estimated that adolescent boys who start smoking now will smoke for approximately 16 years, but that adolescent girls will smoke for at least 20 years (Pierce & Gilpin, 1996). Moreover, smoking results in similar adverse health effects for women as it does for men. Women who smoke more than 15 cigarettes per day, compared to women who do not smoke, are more than five times as likely to have a cardiac event, such as a non-fatal myocardial infarction, or to die from coronary heart disease (Stampfer, Hu, Manson, Rimm, & Willett, 2000). Some studies suggest that women may be at even greater risk than men for smoking-related diseases like lung cancer, myocardial infarction, and severe, early-onset chronic pulmonary disease (Kure *et al.*, 1996; Prescott *et al.*, 1998; Silverman *et al.*, 2000; Zang & Wynder, 1996).

Tobacco use by certain racial/ethnic groups also exacts an extraordinarily high cost. African-Americans and American Indians/Alaska Natives not only have high rates of smoking (e.g., about 27% and 34%, respectively; CDC, 1999), but when compared to Whites, they have significantly higher mortality rates from smoking-related illnesses, such as cancer, cardiovascular disease, and sudden infant death syndrome (SIDS; CDC, 1987; Coultas, Gong, Grad, Handler, McCurdy, & Player, 1994; USDHHS, 1998).

Differences in tobacco motivation and dependence: potential explanations

Tobacco use in women and racial/ethnic minorities is an area of concern based on tobacco-use prevalence rates and the resultant morbidity and mortality. Therefore, it is crucial that tobacco-dependence treatments be as effective as possible in these populations. However, there are reasons to believe that different populations might require different interventions to achieve the greatest net reduction in tobacco-use prevalence. For instance, there is evidence that men and women may differ in facets of tobacco dependence, which should influence ability to quit and response to tobacco-dependence treatments.

One potential source of gender differences in tobacco dependence is affective processing. Negative affect has long been implicated in tobacco use (Baker, Morse, & Sherman, 1987; Ikard, Green, & Horn, 1969; Tomkins, 1966; Zinser, Baker, Sherman, & Cannon, 1992). Women have much higher rates of affective disorders than do men. For instance, their rate of lifetime major depression is about twice that of men (APA, 1994). Moreover, affective symptoms such as depression and anxiety have been linked to increased rates of smoking, increased rates of smoking initiation, and difficulty quitting (e.g., experiencing more withdrawal symptoms and earlier relapse; Anda, Williamson, Escobedo, Mast, Giovino, & Remington, 1990; Black, Zimmerman, & Coryell, 1999;

Brandon, Tiffany, Obremski, & Baker, 1990; Glassman & Covey, 1996; Hall, Muñoz, Reus, & Sees, 1993; Patton, Carlin, Coffey, Wolfe, Hibbert, & Bowes, 1998; Piasecki, Kenford, Smith, Fiore, & Baker, 1997). Depressed smokers report having more stress in their lives, fewer coping resources, and lower self-efficacy for quitting than do non-depressed smokers (Haukkala, Uutela, Vartiainen, McAlister, & Knekt, 2000; Kinnunen, Doherty, Militello, & Garvey, 1996). This suggests that women's greater affective vulnerabilities may produce more severe or prolonged tobacco-withdrawal symptoms (Gritz, Nielson, & Brooks, 1996; Piasecki, Fiore, & Baker, 1998; cf. Gunn, 1986 and Repsher & Group TTNS, 1994 for contradictory results).

Not only are women more likely than men to experience severe negative affect, they are also apt to cope with negative affect in different ways (Hovanitz & Kozora, 1989). New research by Taylor, Klein, Lewis, Gruenewald, Gurung, and Updegraff (2000) suggests that women respond to stress with 'tend-and-befriend' mechanisms designed to care for offspring, to protect the self and others, and to create and maintain social networks rather than utilizing the standard 'fight-or-flight' response to stress. Other research suggests that men have a broader repertoire of coping responses than do women and, in comparison with men, women report having more problems coping with stress and relying more on smoking as a coping response (Grunberg, Winders, & Wewers, 1991; McDaniel & Richards, 1990). Data reported by Nolen-Hoeksema (1987) show that when women deal with negative affect they are more likely than men to ruminate and dwell on their problems; men are more likely to distract themselves. These different repertoires and strategies for dealing with negative affect could render women more dependent on tobacco for ameliorating stress or dysphoria, more vulnerable to social cues to smoke, and more vulnerable to cravings and other withdrawal symptoms.

The two genders may also differ in the importance of different types of reinforcement derived from tobacco use. Some evidence suggests that women are less drawn to the pharmacological properties of tobacco use and are more influenced by social/affiliative consequences of smoking, by ritualistic/habitual elements, or by sensory properties related to smoking (Eissenberg, Adams, Riggins, & Likness, 1999; Perkins *et al.*, 1999; Perkins, 1996). Furthermore, some studies show that women report less dependence on nicotine in that they tend to smoke fewer cigarettes per day and generally have lower scores on questionnaire measures of nicotine dependence (Perkins, 1996). However, despite the possible reduced pharmacological reinforcement and the suggested lower level of dependence, women appear to have at least as much difficulty foregoing smoking as do men.

Taken together, these differences in negative affect, experience of withdrawal, coping styles, and reinforcement properties of tobacco use, all suggest some fundamental differences in mechanisms of tobacco

reinforcement and dependence for men and women. These differences further suggest that tobacco-dependence treatments may have different efficacy in men and women, and that the two genders may require different types of treatment for optimal outcomes.

As discussed earlier, there are no published randomized clinical trials that compare the efficacy of different tobacco-dependence treatments between different racial/ethnic groups. Despite the fact that tobacco dependence in racial/ethnic groups has been studied even less than gender differences, there are reasons to believe that members of different racial/ethnic groups may differ in terms of tobacco dependence, the ability to quit tobacco use, and in response to tobacco-dependence treatments. Royce, Hymowitz, Corbett, Hartwell, and Orlandi (1993) found that, after adjusting for education, age, and gender, African-American smokers who smoked less than 25 cigarettes per day were significantly more likely to smoke within the first 10 minutes after waking in the morning than were white smokers matched for smoking rate. This indicates that African-American smokers may indeed be more dependent on tobacco, regardless of age, gender, and education. In addition, differences in attitudes and beliefs about smoking, which may play a role in dependence, have been documented between Hispanic and non-Hispanic white smokers and between African-American and white smokers (Pérez-Stable, Marín, & Posner, 1998; King, Borelli, Black, Pinto, & Marcus, 1997; Royce *et al.*, 1993). Members of racial/ethnic minority groups may also have different stressors and coping styles. For example, it has been suggested that Native Americans use tobacco and other drugs, such as alcohol, to cope with the stress of acculturating into white society (Schinke, 1996). Acculturation is also a factor in tobacco use in Hispanic populations (Nevid & Javier, 1997).

Unfortunately, it is difficult to draw firm conclusions about ethnic differences in tobacco dependence because so little research has been done on this topic and, as was stated previously, there are no data on differential response to tobacco-dependence treatments. In keeping with the dearth of information in this area, it is unknown whether gender differences found in one racial/ethnic population will generalize to other racial/ethnic populations.

When discussing racial/ethnic differences in tobacco-use motivation and dependence, it is important to address the facets or correlates of ethnicity that may be prepotent in determining outcome success, such as low SES, low education, and English proficiency. Data indicate that SES, as measured by level of education, is directly related to prevalence of smoking cessation (CDC, 1994; Gritz, Thompson, Emmons, Ockene, McLerran, & Nielsen, 1998). This is one example of how different demographic factors, such as education and race/ethnicity, may exert overlapping effects. In order to separate these effects, researchers need to recognize both the orthogonal impacts as well as the interactions among various demographic variables.

Evidence of population differences in response to tobacco-dependence treatment

If gender and race/ethnicity affect processes related to tobacco dependence and reinforcement, this raises the possibility that tobacco-dependence treatments have different efficacy in different populations. There is evidence to support this proposition. For instance, there is evidence from clinical trials that, compared to men, women are less successful quitting smoking across different pharmacotherapeutic and counseling treatments (Perkins, 1996; Perkins *et al.*, 1999; Wetter *et al.*, 1999). However, it is vital to recognize that there appears to be an interaction between treatment and gender, such that women have lower quit rates than men for some treatments but not others (e.g., bupropion SR; Smith *et al.*, 2000). While some studies do not report a significant difference between men's and women's quit rates, the 1980 Surgeon General's Report and, more recently, Perkins *et al.* have concluded that no published studies show *higher* abstinence rates for women than for men following formal cessation programs (Perkins *et al.*, 1999; USDHHS, 1980). Finally, some data suggest that, on average, women are less confident in their ability to quit, less committed to quitting, less likely to try to quit smoking and more likely to relapse if they do quit (Audrain, Gomez-Caminero, Robertson, Boyd, Orleans, & Lerman, 1997; Gritz *et al.*, 1996; Perkins, 1996).

With respect to ethnicity, a national survey has shown that prevalence of quitting is higher for Whites than for Blacks, and higher for non-Hispanic Whites than for Hispanics (CDC, 1994). On average, while African-American smokers smoke significantly fewer cigarettes, start smoking later than Whites, have significantly higher levels of serum cotinine than non-Hispanic Whites, even after controlling for the number of cigarettes smoked, and report more desire to quit, some data suggest that they have more trouble quitting (Caraballo *et al.*, 1998; Hahn, Folsom, Sprafka, & Norsted, 1990; Royce *et al.*, 1993; King *et al.*, 1997). This evidence suggests that racial/ethnic groups do indeed differ in factors related to tobacco use, dependence, and treatment, although insufficient data exist to draw firm conclusions about formal tobacco-dependence programs.

In order to determine the efficacy of tobacco-dependence treatments in racial/ethnic minority groups clinicians and researchers must also consider other differences among study populations that might influence efficacy. For example, factors such as educational status and English proficiency are frequently confounded with racial/ethnic minority status and might affect a smoker's ability to understand directions for medication use or comprehend tobacco-dependence counseling. Similarly, a disparity between the tobacco-dependence treatment provider (e.g., doctor, nurse, psychologist, etc.), and smoker with regards to gender or race/ethnicity might affect the impact of this clinical interaction as has been shown in other treatment contexts (Cooper-Patrick *et al.*, 1999).

Finally, it is important for researchers to consider the issues related to how gender and race/ethnicity can influence clinical trials generally. For example, do gender and/or racial/ethnic minority statuses affect overall recruitment and retention in formal tobacco-dependence treatment studies? There is evidence to suggest that they do. In a study of utilization of nicotine patches, it was found that both women and racial/ethnic minority participants had much lower rates of attendance of treatment groups, than did men (unpublished data). Some factors that could influence recruitment to, and retention in, clinical trials include job schedules, access to treatment, a basic distrust of medical institutions and providers, linguistic barriers, lack of motivation to attend group sessions, and money for transportation and resultant costs for participating in the study (e.g., Stotts, Glynn, & Baquet, 1991; Lichtenstein & Glasgow, 1992; Fournier, Perez-Sable, & Greer, 1993). Unless accounted for, these differences in recruitment and retention may ultimately distort results from clinical trials, limiting the generalizability of results to both genders and racial/ethnic minority groups.

Recommendations and conclusions

It is possible that the pharmacological mechanisms of addiction that affect all dependent tobacco users are so potent that they render gender and racial/ethnic differences moot. However, the theoretical rationales and data discussed here do not support this proposition. The limited extant data suggest that gender and racial/ethnic groups may differ in response to tobacco-dependence treatments. Clinical trials can best reveal whether gender and racial/ethnic groups differ in response to formal tobacco-dependence treatment and reveal which treatments are most efficacious for each group. In an effort to elucidate these differences and to assess their implications, we make the following three recommendations.

1. *Whenever possible, abstinence data from clinical trials should be presented with break-outs for gender and major racial/ethnic groups (cf. Gritz et al., 1996).* This first recommendation is directed at journal editors, reviewers, and investigators. Even if investigators lack the power to compare gender or racial/ethnic minority groups statistically, data on these break-outs should be presented so that research consumers can determine the make-up or nature of the research population. Also, such information will allow other researchers to perform meta-analyses that could provide a more accurate picture of treatment effects for specific populations. With this information, the field will be able to expand beyond broad generalizations derived from treating 'smokers in general.' Along with presenting break-out data, it will also be important to report recruitment and retention data, so that the ultimate cessation results can be examined in context.

2. *Investigators should systematically study factors hypothesized to be relevant to population differences in quitting success (e.g., negative affect, withdrawal processes, socioeconomic factors).* The examination of population-relevant processes and factors may provide a knowledge base that permits a rational, theoretically based development of population-focussed treatments that will produce optimal outcomes for *all* populations, including men and/or Caucasians. Achieving a deeper understanding of tobacco dependence among specific populations may provide the information necessary to improve treatment for all populations.
3. *Investigators should launch evaluations of treatments, or treatment-delivery systems, that are designed for specific populations.* Such evaluations, should, ideally, determine how well an intervention 'works,' whether it works because of theoretically specified reasons, and also how treatment access can be tailored for a specific population. Implicit in this recommendation is the notion that some treatment contexts, such as types and demographic characteristics of treatment providers, may be more appropriate for certain populations than for others.

Perhaps because researchers have embraced so strongly a physiological or pharmacological perspective on dependence, they have largely ignored the fact that addiction is embedded in a social and cultural context. Therefore, researchers conducting clinical trials of tobacco-dependence treatments have left unexamined gender and race/ethnicity, which mark vital social and cultural differences in addition to biological differences. It is eminently reasonable that these markers of social roles, cultural beliefs, SES, and opportunity should affect not only the course of addiction, but response to formal treatment as well.

As our knowledge of tobacco dependence and cessation matures, the culture of cessation science will need to mature. We can no longer focus exclusively on smokers as a homogeneous group utilizing tobacco-dependence treatments. The time has come to broaden the focus of tobacco-dependence treatment investigations. The foundation of knowledge now exists to allow the field to examine not just the efficacy of tobacco-dependence treatments in randomized controlled trials but also the effectiveness of these treatments in everyday settings, such as clinics, hospitals, and public health centers. Doing so will aid in gaining a better understanding of how addiction is influenced by gender, cultural, affective, and socioeconomic factors.

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Note

1 Meta-analytic inclusion criteria were as follows: randomized placebo/comparison clinical trial randomized on the patient level, published in a peer-reviewed journal in English, presented at least 5-month follow-up data, published between 1 January 1975 and 1 January 1999.

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