ACCESS, ENGAGEMENT, AND TOBACCO TREATMENT BY TELEPHONE QUITLINES AMONG LESBIAN, GAY, BISEXUAL, AND TRANSGENDER ADULTS

by

Thomas Ylioja

B.S.W., University of Calgary, 2004

M.S.W., University of Toronto, 2011

Submitted to the Graduate Faculty of

The School of Social Work in partial fulfillment

of the requirements for the degree of

Doctor of Philosophy

University of Pittsburgh

2018

UNIVERSITY OF PITTSBURGH

SCHOOL OF SOCIAL WORK

This dissertation was presented

by

Thomas Ylioja

It was defended on

June 12, 2018

and approved by

Jeff Shook, Ph.D., Associate Professor, School of Social Work

Gerald Cochran, Ph.D., Associate Professor, School of Social Work

Hilary A. Tindle, MD, MPH, Associate Professor, School of Medicine, Vanderbilt University

Dissertation Advisor: Christina Newhill, Ph.D., Professor, School of Social Work

ACCESS, ENGAGEMENT, AND TOBACCO TREATMENT BY TELEPHONE QUITLINES AMONG LESBIAN, GAY, BISEXUAL, AND TRANSGENDER ADULTS

Thomas Ylioja, Ph.D.

University of Pittsburgh, 2018

Tobacco smoking is the primary cause of early death and disability in U.S. adults, and the prevalence of tobacco use is disproportionate among socially disadvantaged populations, including people who identify as lesbian, gay, bisexual, or transgender (LGBT). Stigma stress associated with an LGBT identity is theorized to underlie this disparity, and may present barriers to tobacco use treatment. Evidence-based tobacco treatment includes telephonic cessation counseling by quitlines, however this mode of treatment has not been systematically evaluated for LGBT populations with regards to access, engagement, and treatment outcomes. In this study, access to quitlines was investigated as 1) differences in rates of quitline referrals between cisgender heterosexual (CH) and LGBT hospitalized patients, 2) willingness to accept a referral among patients attending an LGBT-tailored primary care clinic, and 3) calls to the quitline by LGBT identified adults during mass media campaigns. Quitline engagement in counseling calls and nicotine replacement, and 30-day self-reported cessation treatment outcomes seven months after intake was compared between CH and LGBT callers, using propensity score matching to estimate the average treatment effects.

Nearly one-third of LGBT inpatients were referred to the quitline by a tobacco treatment specialist, a higher rate compared to CH but not statistically significant, and 40% of patients in the LGBT-tailored clinic would accept a quitline referral at the time of their visit. Mass media campaigns were effective at proportionally increasing quitline intakes with LGBT callers from

the pre-campaign to the campaign duration over six campaigns. LGBT females were significantly less engaged in treatment than CH, and had a trend ($p = .081$) towards lower cessation rates. There were no differences in engagement or cessation outcomes between LGBT and CH males.

The research conducted for this study was limited by convenience sampling methodology, social desirability bias, reliance on self-report measures of identity and cessation, as well as modeling outcomes with observational data. Implications for social work practice and tobacco control efforts are discussed within the context of these research findings. Future research should examine factors associated with successful treatment for LGBT quitline callers, with special emphasis on females.

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

PREFACE

This dissertation project was only possible with the participation and support of many people, from patients who volunteered their time to complete a survey, to the dedicated staff and medical directors of the UPMC Tobacco Treatment Service at Presbyterian hospital, state evaluators and passionate tobacco control folks in the Pennsylvania Division of Tobacco Control and Prevention. I'm eternally grateful to all of them for their patience and willingness to take a chance on a doctoral student.

My appreciation and thanks go to my dissertation committee members Dr. Cochran and Dr. Shook for agreeing to see me through to the end, and for your support and guidance along each step of this journey. In particular, my deepest gratitude to Dr. Newhill, for introducing me to the PhD program when I was looking to apply, to day 1 of Theory I, through the last day of this dissertation – your unwavering support, encouragement, and willingness to be my sounding board is beyond all measure of thanks. And, to Dr. Tindle, I am forever thankful that you took on a chance on Canadian wanting to do research, and I remain so for every chance I get to learn from you! The consistent challenge to do my best, and then do a little bit more has kept me focused, has taught me to find *sisu* and always reach a little bit further than I thought I could. Finally, to Tamir, my love to you for giving me space when I needed it, but always knowing when to step in to keep me going over the last 4 years. This was possible because of you!

Funding for this dissertation study came from an award by the Center for Health Equity in the Graduate School of Public Health at the University of Pittsburgh.

1.0 TOBACCO SMOKING AND SOCIAL WORK

Smoking tobacco causes tremendous harm to individual health and wellbeing and is the primary cause of preventable death and early mortality in adults (U.S. Department of Health and Human Services, 2014). In 2014, the 50th anniversary Surgeon General's report on smoking and health described smoking-related disease as among the most devastating public health epidemics of the twentieth century. The research synthesized by the Surgeon General and reported to the U.S. Congress over the past 54 years consistently shows an increasing magnitude of harm associated with tobacco smoking.

Cigarette smoking, in particular, is conclusively known to cause many medical conditions (U.S. Department of Health and Human Services, 2014). This includes most forms of cancer in adults, cardiovascular disease including heart attacks and peripheral vascular disease, and pulmonary disease including chronic obstructive pulmonary disease and exacerbation of underlying lung problems. Smoking is also known to cause diabetes, reproductive problems in men and women, problems in the immune system, increase risk of bone fractures, and worsen nearly every other chronic health condition. In fact, smoking is now recognized to cause 17% greater mortality than was previously believed, accounting for more than 500,000 deaths annually in the United States (Carter et al., 2015). Smoking has additional impacts on society through the toxic environmental smoke created, particularly when tobacco is smoked in enclosed spaces such as restaurants, bars, work places, and the home or car. In addition to the individual

burden of illness, tobacco smoking has an enormous impact on lost productivity and health care costs, and will require systemic public health promotion and prevention to eradicate (U.S. Department of Health and Human Services, 2014).

Today, socially marginalized groups in American society are most at risk for smoking, with rates higher than the 2015 national average (15%) in the National Health Interview Survey (NHIS) for populations associated with physical and mental disabilities (22%), low socioeconomic status markers including living in poverty (26%) and low levels of education (GED: 34%, high school diploma 20%), as well as for individuals identifying as lesbian, gay, and bisexual (LGB; 21%), and those who reported serious psychological distress (41%) (Jamal et al., 2016). Additionally, these identities and social status indicators are additive at the population group level, revealing high rates of smoking for the most vulnerable sectors of American society. Fortunately, the rates of cessation are increasing (Mendez, Tam, Giovino, Tsodikov, & Warner, 2016) and most of the people who initiated tobacco smoking in the past have now quit, with health surveys showing 22% of adults report former cigarette smoking (Jamal et al., 2015). However, people who have stopped smoking tobacco are overrepresented by higher incomes and education, surrogate measures for socioeconomic status (SES), with increased odds of cessation reaching 2.5 times for the top SES groups compared to the lowest (Hill, Amos, Clifford, & Platt, 2014; Sheffer et al., 2012), perhaps unsurprisingly as the policy responses to the problem of tobacco have been primarily information and education.

In the confluence of social marginalization and tobacco use disparities, the discipline of social work is well situated to address tobacco use, but has paid insufficient attention to tobacco use as a social problem. Social workers, as health practitioners and policy advocates, seek to restore individual and societal health by treating mental health and substance abuse problems,

and removing barriers to care for impoverished and marginalized groups by addressing issues of social injustice (Miller et al., 2017). As such, social workers are charged with assisting the same populations illustrated in the demographics of tobacco use disparities. In directly addressing tobacco disparities with vulnerable populations, social work can demonstrate that both understanding and working to end social marginalization is required to address health disparities.

1.1 TOBACCO SMOKING AMONG LGBT POPULATIONS

Individuals identifying as LGBT are at increased risk for smoking, having as high as twice the rates compared to heterosexual counterparts depending on the sampled population (Lee, Griffin, & Melvin, 2009; Ryan, Wortley, Easton, Pederson, & Greenwood, 2001). Tobacco-related health disparities were highlighted in the Institute of Medicine landmark report on LGBT health and identified as a research priority (Institute of Medicine, 2011). Although criticized for not addressing much of the extant research on LGBT smoking and health (Lee, Blosnich, & Melvin, 2012), the report nevertheless demonstrates a growing need to understand and ameliorate health disparities caused by smoking for the LGBT population. It is important to note that while individuals who identify as transgender are often included in sexual minority research (the "T" in LGBT), much of the data reported is from populations that identified as LGB, some of whom may also identify as transgender. There is a dearth of research for smoking cessation treatment in the transgender population, a lack of explicit acknowledgement of gender identity in health surveys, and a growing understanding that the experiences of gender minorities may be substantially different from sexual orientation minorities (Galupo, Henise, & Mercer, 2016). However, to acknowledge the importance of inclusivity for this population, individuals who

identify as a gender minority but not a sexual orientation minority are included in this current research, and may be grouped together under the umbrella of LGBT.

The prevalence rates of smoking tobacco among LGBT populations has been consistently elevated in nearly every study that includes LGBT groups as a population of interest. A review of 42 studies from 1987-2007 reported 1.5-2.5 times increased odds for smoking among sexual minority populations compared to heterosexual populations (Lee et al., 2009). Since that review, several state and national representative health surveys have included sexual orientation identity questions, providing methodologically strong comparisons of disparate smoking rates between minority and majority sexual orientation identities. These studies generally continue to find that sexual minorities have greater odds and rates of smoking compared to majority respondents.

While the 2001-2010 National Health and Nutrition Examination Survey (NHANES) found a non-significant difference in odds ratios (OR) [95% confidence intervals] compared to heterosexuals for current smoking among gay and bisexual men (Gay: OR = 1.25 [0.69, 2.27]; Bi: OR = 1.30 [0.68, 2.46]), but higher for sexual minority females (Cochran, Bandiera, & Mays, 2013; Farmer, Bucholz, Flick, Burroughs, & Bowen, 2013), these results are incongruent with data from a decade of national and state population health surveys, such as the National Health Interview Survey (NHIS) and Behavioral Risk Factors Surveillance System (BRFSS) that consistently show elevated rates across all sexual minority groups. In fact, using pooled data to increase sample size of LGBT respondents from the 2013-2015 National Health Interview Survey (the first three years with LGBT data) with non-institutionalized American adults, the current smoking rates for all sexual orientation minorities are higher than for heterosexuals. Furthermore, these rates are similar for gay-identified men and gay- or lesbian-identified women, but are higher for both bisexual men and women (Table 1.1), revealing further sexual identity

and gender disparities, particularly for sexual minority women compared to their heterosexual counterparts.

Table 1.1

Smoking Rates Across Sexual and Gender Identity Populations, Pooled Data From 2013-2015 National Health Interview Surveys

	Males		Females	
Sexual Identity	%	95% CI	%	95% CI
Gay/Lesbian	23.15	[19.36, 27.43]	22.32	[18.51, 26.65]
Bisexual	25.59	[18.56, 34.18]	25.38	[20.51, 30.95]
Heterosexual	18.5	[17.94, 19.07]	14.36	[13.87, 14.86]

Note: CI=confidence interval. Estimates weighted for selection probability, and non-response bias to the U.S. non-institutionalized adult population.

Data from national surveys that include sexual orientation questions has continued to highlight elevated rates of smoked tobacco among LGBT college students across racial groups (cigarettes: 16-34% vs. 5-17%; (Blosnich, Jarrett, & Horn, 2011), and any tobacco use in the past year was double (44% vs. 22%) among female sexual minority youth and young adults (Brewster & Tillman, 2012). National tobacco surveys have revealed higher prevalence of novelty product use such as hookah (LGBT: 8-14% vs. Heterosexual: 4-11%) across racial groups (Blosnich et al., 2011), flavored cigars (8% vs. 3%) for sexual minority adults (King, Dube, & Tynan, 2013), and ever using an electronic nicotine delivery system (25% vs 14%) (Huang, Kim, Vera, & Emery, 2016) that suggest a disproportionate impact of product marketing.

Research into the demographics of LGBT tobacco smoking has highlighted risks across the lifespan with sexual minority adults age 50 or older having increased odds of 1.57 [1.22, 2.00] for women, and 1.52 [1.18, 1.96] for men, after adjusting for education, income, marital status, and having children (Fredriksen-Goldsen, Kim, Barkan, Muraco, & Hoy-Ell, 2013). National data also suggest that LGBT individuals who smoke may more frequently meet the definition of nicotine dependence (DSM-IV criteria; LGBT: 67% vs. Heterosexual: 57%), and tobacco smoking rates are differentially impacted by state tobacco control policy (Hatzenbuehler, Keyes, Hamilton, & Hasin, 2014). Hatzenbuehler and colleagues showed LGBT people had increased odds of 1.91 [1.27, 2.85] for current smoking compared to heterosexuals in states with the most permissive tobacco policy, compared to 1.49 [1.00, 2.22] in states with the most restrictive policies. Together, these state and national surveys provide solid evidence for a tobacco smoking disparity among sexual minority populations across the United States.

1.2 STUDY PURPOSE

The evidence base of treatment modalities for tobacco use and nicotine addiction is extensive. The clinical guidelines for tobacco use treatment recommend individual, group, and telephone counseling, finding evidence of effectiveness for each intervention modality in assisting individuals to stop smoking (Fiore, Jaén, Baker, & et al, 2008). The guidelines also recommend concomitant use of any of the seven first-line pharmacotherapy options to increase abstinence, including five forms of nicotine replacement (transdermal patch, lozenge, gum, nasal spray, inhaler), bupropion, and varenicline (Fiore et al., 2008). Currently, few tobacco cessation

interventions that address the needs of LGBT populations have been published in peer-reviewed literature including individual and group counseling, and none of the published studies examined the use of telephone quitlines.

The tobacco treatment guidelines examined evidence from nine studies examining the effect of quitlines for tobacco cessation and found increased odds of 1.6 [1.4, 1.9] for cessation compared to minimal or no counseling, or self-help alone, including increased odds of 1.3 [1.1, 1.6] for cessation when quitline counseling was added to cessation medication compared to medication alone (Fiore et al., 2008). Similarly, a Cochrane review found callers to quitlines who enrolled in proactive counseling had a risk ratio of 1.38 [1.28, 1.49] for self-reported cessation after 6 months, with evidence of a dose-response for cessation, particularly with three or more calls (Stead, Hartmann-Boyce, Perera, & Lancaster, 2013). Telephone quitlines offer treatment for all tobacco products, including both smoked and smokeless forms (NAQC, 2016), and are an important resource for cessation, particularly because they provide free counseling, often provide free nicotine replacement therapy to eligible callers, and are available in every U.S. state. In addition, telephone-based interventions are highly accessible to individuals without transportation or who live in remote areas (Cummins, Bailey, Campbell, Koon-Kirby, & Zhu, 2007; Ossip-Klein & McIntosh, 2003).

Telephone quitlines for tobacco cessation use a variety of models, but generally offer information, including LGBT-specific material, proactive (quitline-initiated) and/or reactive (caller-initiated) single-session or multi-session brief counseling, combined with offers of medication dependent upon state funding (Cummins et al., 2007; NAQC, 2016; Ossip-Klein & McIntosh, 2003). The counseling intervention is delivered by trained tobacco treatment specialists, and generally callers cannot request a specific counselor. Counseling is tailored to the

individual and addresses motivation to stop smoking including setting a quit date, promotes the use of quit aids, assists callers with coping during the cessation attempt, and plans for preventing relapse (Cummins et al., 2007).

Many quitlines additionally offer specialized modules for priority populations, such as pregnant women or adolescents (Cummins et al., 2007; NAQC, 2016); however, currently LGBT callers do not receive specialized treatment. Quitline counselors receive training in cultural issues related to tobacco use disparities, including offering to mail out specific information on LGBT tobacco disparities (Lukowski, Morris, Young, & Tinkelman, 2016). Beginning in 2015, quitline counselors at one major quitline service provider (National Jewish Health, Denver, Colorado) began receiving additional training on cultural issues specific to the LGBT community. This training included additional information about addressing sexual orientation identity during the call to establish trust, using gender-neutral terms when discussing significant others, discussing tobacco use prevalence and marketing impacts on LGBT smoking to enhance motivation, and discussing other LGBT cultural content and specific barriers to tobacco cessation (A. Lukowski, personal communication, April 14, 2017).

Most quitlines allow healthcare and other agency providers to refer an individual by fax (Cummins et al., 2007; NAQC, 2016), and more recently by using electronic referrals from health records (Adsit et al., 2014; Tindle et al., 2016). Systems that initiate proactive quitline counseling after a referral by a healthcare providers are effective in helping patients enroll in treatment (Vidrine, Shete, Cao, & et al., 2013), however no previous research has examined the feasibility or impact of provider referral systems for LGBT patients.

Mass media interventions that promote tobacco control through quitlines are also effective at changing smoking behavior in adults (Bala, Strzeszynski, Topor-Madry, & Cahill,

2013). In 2012, The Centers for Disease Control and Prevention sponsored the first *Tips From Former Smokers* (*Tips)* campaign featuring graphic emotional advertisements in mass media outlets, including printed news and magazines, internet, information posters, billboards, radio, and television. In an evaluation of the *Tips* campaign, researchers demonstrated that the campaign cost $480 per person-quit and only $393 per life-year saved (Xu et al., 2015). The *Tips* campaign was effective at increasing recall of anti-tobacco messaging as well as overall quit attempts at a population level (McAfee, Davis, Alexander, Pechacek, & Bunnell, 2013).

Additional research found an increased intention to quit among the population of current tobacco users during *Tips* campaign (Duke et al., 2015), while other campaigns, such as the *truth*® campaign targeting youth tobacco use, decreased youth smoking initiation (Davis, Farrelly, Messeri, & Duke, 2009). Research on mass media interventions, has further demonstrated that higher doses increased campaign recall (87% vs 75%) and increased quit attempts (39% vs 35%) (McAfee et al., 2017). For LGBT individuals, research suggests that awareness of anti-tobacco campaign messages is more commonly reported from general, rather than LGBT, media sources (Matthews, Balsam, et al., 2014), suggesting that LGBT individuals are likely to be exposed to these mass media interventions. No studies have examined the effects of mass media interventions on intention to quit, calls to the quitline, or quit attempts in LGBT populations.

Among published studies for tobacco control with LGBT populations (reviewed in Chapter 2), a key strength is the demonstration of efficacy for initiating cessation, as well as feasibility and replicability of delivering LGBT-tailored care across different settings and geographic areas. While clinical intervention trials delivered to the general population showed no difference in cessation or relapse rates for LGBT-identified participants, these studies

demonstrate the feasibility and importance of including sexual orientation identity in smoking cessation trials to enhance the literature about whether interventions work equally well for LGBT subgroups. The evidence is insufficient to make inferences about the effectiveness of either LGBT-tailored compared to non-tailored mode of interventions. To date, no comparative effectiveness trials have been published to know if tailored programs are superior to non-tailored programs among sexual minorities. Overall, in order to reduce the tobacco disparity that exists for LGBT people, research and evaluation of the impact for current treatment and tobacco reduction strategies is required.

Finally, the impact of the social environment on the health of LGBT people is a relatively new field of study. This study presented herein, aimed to illustrate how social work can enhance the growing literature base that addresses smoking for this particularly vulnerable population. In the next chapter, the rationale for focusing on a social status indicator, that is LGBT identity, within the context of tobacco smoking further demonstrates why social work research and practice is ideally situated to address LGBT smoking disparities.

1.3 RESEARCH QUESTIONS

The objective of this study was to investigate the effectiveness for LGBT populations of the most ubiquitous interventions for tobacco control: referral to and mass media promotion of (that is, access) tobacco telephone quitlines, engagement with telephone quitlines, and the cessation outcome of telephone tobacco treatment. While referral systems, mass media promotional interventions, and telephone quitlines services are all evidence-based tobacco control strategies,

the effect of these interventions for LGBT people has not been studied. Specifically, this study aimed to:

Aim 1: Investigate access to quitlines among LGBT individuals who use tobacco by a) assessing the characteristics associated with a referral to the quitline from an academic teaching hospital with an inpatient tobacco treatment service, b) assessing willingness to accept a referral in a primary care clinic tailored to serving the needs of LGBT patients, and c) evaluating the effect of the *Tips From Former Smokers* mass media campaign on increasing calls to tobacco quitlines from LGBT individuals who smoke tobacco.

Hypothesis 1: a/b) Providing care will have equal effectiveness in generating referrals to the quitline for LGBT patients in acute care and LGBT-tailored primary care settings, and c) based on preliminary data from Pennsylvania, the effect of the *Tips* campaign will equitably increase calls to the quitline from LGBT individuals across multiple campaigns.

Aim 2: Evaluate the effectiveness of a tobacco quitline in engaging LGBT callers in treatment calls and medication use in proportion to the community size and prevalence of smoking,

Hypothesis 2: States that provide care to quitline callers will have equal effectiveness for LGBT and non-LGBT individuals in engaging callers in treatment calls and medications.

Aim 3: Evaluate the effectiveness of tobacco quitlines in facilitating smoking cessation at seven months for LGBT callers.

Hypothesis 3: LGBT callers will have lower rates of smoking cessation at seven months.

2.0 LITERATURE REVIEW

The problem of LGBT tobacco use arises from multiple risk factors and exists within a sociocultural context that is often hostile towards LGBT individuals. The reasons driving the tobacco use disparity among LGBT adults is associated with risks that are common across populations of people who use tobacco, but also to factors that are unique to LGBT groups. This chapter examines the published research that has sought to understand the associations with tobacco use, and situates LGBT tobacco use within a contextual framework of stigma and minority stress. Finally, interventions that have aimed to address LGBT tobacco use are discussed and the gaps in the literature supporting this current study are illustrated.

2.1 WHAT IS KNOWN ABOUT LGBT TOBACCO USE?

The higher rate of smoking among LGBT identified individuals is influenced by higher prevalence of common risk factors, as well as unique factors impacting the LGBT community (Blosnich, Lee, & Horn, 2013). Generally, at the population level, higher smoking rates are associated with lower education, lower income, younger adult age, having mental illness, or a disability (U.S. Department of Health and Human Services, 2014). However, when compared to either LGBT non-smokers or heterosexual smokers, correlates of LGBT smoking include higher rates of smoking across the lifespan (Boehmer, Miao, Linkletter, & Clark, 2012; Fredriksen-

Goldsen et al., 2013; Matthews, Hotton, DuBois, Fingerhut, & Kuhns, 2011), and both higher and lower levels of education, but similarly correspond with lower income and lack of health insurance in the pre-Affordable Care Act environment (Balsam, Beadnell, & Riggs, 2012; Boehmer et al., 2012; Hughes, Johnson, & Matthews, 2008; Matthews, Riley, et al., 2014; Tang et al., 2004). LGBT groups also suffer from higher rates of alcohol use, with odds ratios (OR) of 1.5-2.5 across sexual identities, drug use (Balsam et al., 2012; Green & Feinstein, 2012), and increased odds of 1.5-2.5 for psychological distress among gay men, as well as both bisexual men and women (Blosnich, Farmer, Lee, Silenzio, & Bowen, 2014). LGBT adults report more indicators of stress, particularly related to stigma, B=0.26, SE=0.08, and a higher number of stressful events, B=0.59, SE=0.28, compared to heterosexuals (Meyer, Schwartz, & Frost, 2008); all of these factors are associated with higher risks of smoking. Thus, for LGBT groups the higher prevalence of smoking-associated comorbidities may partially explain the higher prevalence of current tobacco smoking.

Research into tobacco smoking correlates also reveals additional unique LGBT-identity related factors associated with increased smoking prevalence. Gender-stratified analysis of the 2003-2010 NHANES data identified household composition as an important factor in LGBT smoking. Researchers showed that gay and bisexual men who lived with other smokers were more likely to smoke compared with heterosexual men who lived with a smoker, OR: 7.65 [1.58, 36.96]. However, for women, sexual minority status alone, and not the smoking status of others living in the home, was associated with higher odds of smoking (Gamarel et al., 2016). Smoking among sexual minority youth and young adults is associated with negative reactions to sexual orientation disclosure, B=0.42 [0.18, 0.67], (Rosario, Schrimshaw, & Hunter, 2009), as is living in areas with high levels of structural stigma, defined by the absence of protective legislation,

policies and safe spaces for LGBT communities, risk ratio = 0.97 [0.96, 0.99] for less structural stigma (Hatzenbuehler, Jun, Corliss, & Austin, 2014; Pachankis, Hatzenbuehler, & Starks, 2014). Higher odds ratios for smoking among LGBT individuals is also associated with experiencing physical violence, LGBT = 1.65 [1.03-2.67] compared to heterosexuals = 1.39 [1.00-1.92] (Blosnich & Horn, 2011), as well as victimization specifically related to having a sexual minority identity, OR = 1.18 [1.01-1.37] (Newcomb, Heinz, Birkett, & Mustanski, 2014). Recent research also suggests that experiencing frequent anti-LGBT microaggressions, a subtler form of incivility and discrimination compared to overt violence (Sue, 2010), on college campus is associated with increased odds of smoking, OR = 1.72 [1.03-2.87] among LGBQ students, after adjusting for sociodemographics, substance use, exposure to violence, and academic wellbeing (Ylioja, Cochran, Woodford, & Renn, 2016).

Receiving social support and connecting to the LGBT community can be both a risk and a protective factor for smoking (Johns et al., 2013; Newcomb et al., 2014); the higher tobacco smoking prevalence leads to increased exposure, and may be further influenced by sub-culture identification within the larger LGBT community. Among sexual minority women, reporting a butch compared to femme self-identity was related to increased rates of smoking, β=0.38, SE=0.15, $p<0.05$ (Rosario, Schrimshaw, & Hunter, 2008). Among men, identification with one of 12 subgroups was also related to increased risk of smoking, where subgroup identity explained 7% of the total smoking variance after controlling for demographic factors (Willoughby, Lai, Doty, Mackey, & Malik, 2008).

The LGBT community has also been a target of tobacco advertising in movies with LGBT themes and in community publications, that may have increased resistance to tobacco control activity because of a sense of community legitimacy derived from target market status

(Dilley, Spigner, Boysun, Dent, & Pizacani, 2008; Smith, Offen, & Malone, 2005; Smith, Thomson, Offen, & Malone, 2008; Stevens, Carlson, & Hinman, 2004; Washington, 2002). Tobacco companies have also been accused of silencing criticism from the LGBT community through philanthropic donations to AIDS service organizations (Offen, Smith, & Malone, 2003). Additionally, in the context of the current predominant form of tobacco advertising as promotional displays and price discounts at the point-of-sale in tobacco retail outlets (Federal Trade Commission, 2015), recent research found that tobacco retailer density is increased by one additional retailer for every 100 same-sex households per 1000 population, or higher among neighborhoods where same-sex couples live (Lee, Pan, Henriksen, Goldstein, & Ribisl, 2015). Each additional tobacco outlet per 10 kilometers of roadway has been linked to increased odds of 3.75 [1.18, 11.90] for tobacco smoking initiation among young adults age 25-34, and 3.16 [1.03, 9.75] for non-combustible tobacco among young adults age 18-24 (Cantrell et al., 2015). These findings suggest that as LGBT young people move into areas with more concentrated LGBT populations to build community and access social support, they are also more likely to be exposed to tobacco advertising and to initiate tobacco use.

There are also barriers to LGBT individuals accessing and participating in evidence-based tobacco treatment. Documented barriers to cessation for LGBT people include incorrect beliefs about cessation medications, such as having addictive potential or as a cause of tobacco-related illness, as well as low rates of use and low adherence to evidence based smoking cessation pharmacotherapy (Burns, Deaton, & Levinson, 2011; Levinson, Hood, Mahajan, & Russ, 2012; Schwappach, 2009), although these barriers are not specific to sexual minorities. Sexual minority men have also been found to have less awareness of cessation resources, specifically quitlines, with 67% of gay or bisexual men compared to 84% of heterosexual men

(Fallin, Lee, Bennett, & Goodin, 2016). National survey data similarly shows that LGBT individuals who smoke have lower rates of accessing one or both of counseling and medications (14.5% vs. 31.7%) compared to their heterosexual counterparts (Babb, Malarcher, Schauer, Asman, & Jamal, 2017). Other barriers to cessation have been identified as the strong socialization factor of smoking in a community with high tobacco smoking rates, particularly the association of tobacco use with LGBT bar or club culture (Burkhalter, Warren, Shuk, Primavera, & Ostroff, 2009).

Several studies examining the perspectives of LGBT individuals towards tobacco cessation have found strong interest in quitting (Levinson et al., 2012; Robinson, Brown, & Moody-Thomas, 2014; Schwappach, 2008). LGBT individuals also appear particularly motivated to attend treatment when cessation resources are LGBT-specific rather than interventions targeted towards the general population (Baskerville, Shuh, Wong-Francq, Dash, & Abramowicz, 2017; Burns et al., 2011; Schwappach, 2008). However, a higher number of gay men (61%) compared to heterosexual men (53%), and among gay or lesbian women (61%) compared to heterosexual women (55%), reported a cessation attempt in the last year, yet the prevalence of former smokers in LGBT groups remains lower, 46% vs 59% and 48% vs 58% respectively, (Pizacani et al., 2009) suggest that higher rates of relapse may also characterize barriers to successful cessation for LGBT people.

2.2 THEORETICAL FRAMEWORK: STIGMA AND MINORITY STRESS

As individuals learn to recognize and experience the stigma of being LGBT, the chronic nature of the stress of being a stigmatized minority in a hostile society slowly depletes their

cognitive, emotional, and social coping resources (Hatzenbuehler, 2009). Within the stress-process paradigm, the depletion of self-regulation predisposes individuals to health problems (Dohrenwend, 2000; Pearlin & Bierman, 2013), and substance use, such as tobacco, may be used as a negative coping strategy (Hatzenbuehler, 2009). In this section, a conceptual framework of stigma and minority stress theories to examine LGBT tobacco smoking disparities is illustrated.

Nicotine, one of the thousands of chemicals present in tobacco smoke, is a potently addictive substance that activates nicotinic acetylcholine receptors and prompts release of dopamine and other neurotransmitters in the brain, primarily through the $\alpha 4\beta 2$ receptor that is thought to mediate nicotine dependence (Benowitz, 2009). The positive pleasurable effects of this neuronal activation, combined with the negative behavioral and cognitive effects of nicotine withdrawal, are thought to underlie the psychobiology that sustains use of tobacco despite the known health risks (Benowitz, 2009). Beyond the biology, rational choice addiction theories and theories of planned behavior illustrated by the Health Belief Model (HBM) (Rosenstock, 1966) highlight the importance of individual beliefs and attitudes towards health behaviors such as tobacco use. These theories rely on assumptions of well-informed tobacco users (West & Brown, 2014), despite evidence of education-related prevalence disparities, and making momentary decisions during periods of intense cravings (Skinner & Aubin, 2010). The HBM has limited predictive power for behavior (Carpenter, 2010), and fails to account for enduring discriminatory and stigmatic social contexts surrounding LGBT tobacco use. While these theories, among many others, help to explain when, why, and how individuals become dependent upon a substance, they are inadequate to explain why LGBT people have higher rates of tobacco smoking when all other characteristics appear equal. In order to understand why tobacco smoking is higher among

LGBT populations, a conceptual model that explores the social context of stigma and minority identity is required.

2.2.1 Stigma Theory

The concept of stigma is integral to the discussion of smoking among LGBT people because of the multiple devalued social status indicators presented by tobacco smoking (Stuber, Galea, & Link, 2008) and a sexual minority identity (Meyer, 2003). Stigma as a social research phenomenon derives from the seminal work of sociologist Erving Goffman (1963), in which he illustrated how personal characteristics can represent a devalued social identity, resulting in identity management efforts and identity ambivalence. More recently, a resurgence of interest in stigma as a social cause of health disparities has highlighted the impact of inequality and social disadvantage arising from social interaction that involves stigmatized identities (Link, Phelan, & Hatzenbuehler, 2014). The concept of stigma has been developed into a process that relies on several converging elements to be enacted and to impact upon the individual.

People naturally recognize the characteristics and behaviors that differentiate individuals during social interaction. Individuals may even self-label and begin to identify with differences that are observable to others (Thoits, 1985), similar to the 'looking glass self' (Cooley, 1902) concept of self-identification, during which a social identity is shaped through the interaction of a person with others. Most of these differences are irrelevant to interpersonal interaction, but some of these differences become salient depending on the social context; that is, the salience is socially determined (Link & Phelan, 2001). Salience may depend on whether the difference is concealable, that is, a stigmatized individual may act to conceal the stigmatized behavior or identity to avoid it becoming salient. Salience may also arise if the difference is viewed as

reversible or treatable, socially disruptive, or is aesthetically displeasing. Salience may also depend upon whether the cause of the difference is attributed to the individual based upon their self-control or behaviors, or if the difference creates a sense of peril in the eyes of the observer (Jones, 1984).

Once a difference is identified and becomes salient to social interaction, it can also be connected to a stereotype, including to a stereotype with negative attributes (Link & Phelan, 2001). For example, when a person is observed smoking tobacco, the behavior may be viewed as objectionable and connected with poor decision making or unhealthfulness on the part of the individual. Similarly, when a sexual minority identity is revealed, to the observer the identity might be connected with moral failing, promiscuity, or substance use based upon cultural stereotypes. Outside of social interaction, these stereotypes might be banal, however these differences become impactful when they are used as a mechanism of developing social cohesion or control. In the context of interpersonal interaction, a negatively stereotyped difference becomes enacted when it is used to exploit a devalued group, enforce social norms, or avoid the potential of a perceived diseased status from spreading within a social group. Enacted stigma can thus be seen in the interpersonal or social efforts to keep people with observable differences "down, in, or away" (Phelan, Link, & Dovidio, 2008).

The constructed labels and stereotypes are also enacted to differentiate between socially desirable and undesirable behaviors or identities (Link & Phelan, 2001). Enacted stigma provides a mechanism to ascribe a negatively-viewed characteristic or behavior to a social identity that can subsequently be dehumanized and devalued (Goffman, 1963). As a consequence, the individual no longer 'has' but 'becomes' the stigmatized attribute. Social status loss, social disadvantage, and the negative effects of discrimination are made possible because the person is

no longer a valued social group member, but rather is an object of stigma (Link & Phelan, 2001). Stigma enactment also requires social, economic and political power to enforce the in-group norms against people viewed as different (Link & Phelan, 2001; Phelan et al., 2008). For LGBT people, denial of civil rights and protections has been possible because, as a community defined by a shared identity, LGBT people lacked the social resources to resist and reverse the stigma associated with being a sexual or gender minority.

Stigma discrimination is enacted to keep the stigmatized down, in, or away (Phelan et al., 2008), and reinforce social disadvantage and inequality (Link et al., 2014) through interpersonal, structural, and intrapersonal means. Discrimination may be individually directed against a stigmatized person by withholding some social, economic or political resource (Link & Phelan, 2001; Link et al., 2014). It may also be enacted structurally against a stigmatized group of people through the accumulation of laws, social policies, and institutional practices that create systemic barriers of disadvantage. Structural discrimination consequently creates inequality in health by reducing access to the resources necessary to prevent and treat a health problem (Hatzenbuehler, Phelan, & Link, 2013). Discrimination may also be enacted intrapersonally as a result of the socialization and indoctrination of beliefs about dominant cultural stereotypes (Link & Phelan, 2001). Stigmatized individuals react to social cues and internally activate, or 'play-out', cultural stereotypes by fulfilling negative social expectations, and experiencing increased sensitivity to perceived social rejection, heightened identity vigilance, as well as identity ambivalence (Major & O'Brien, 2005). In the context of tobacco quitlines, perceived and enacted stigma discrimination could reduce access for LGBT individuals in self-initiating calls or receiving provider-initiated referrals for tobacco treatment, while targeted messages that portray the quitline as an LGBT-affirming resource could have a pro-equality effect.

As is the case for many LGBT people, the stigmatized characteristic may not be readily visible to others, allowing a degree of passing (Goffman, 1963) or concealability (Jones, 1984; Pachankis, 2007; Smart & Wegner, 1999). Engaging in efforts to manage social interaction in ways that conceal a stigmatized identity increases the individual's preoccupation with stigma-related thoughts (Smart & Wegner, 1999). Attempts to suppress the thoughts and maintain secrecy lead to more intrusive thoughts about the held secret, followed by a ruminative process of thought suppression and intrusion (Smart & Wegner, 1999). This process of concealment, thought suppression, and thought intrusion also leads to increased vigilance about being 'discovered', and to suspiciousness of others during social interaction (Pachankis, 2007). Rumination on the concealed stigma accordingly increases psychological distress, real and perceived social isolation, and decreases real and perceived social support (Hatzenbuehler, Nolen-Hoeksema, & Dovidio, 2009). Although concealing stigma might be socially important in some contexts, to avoid discrimination as an example, it also results in social, emotional, and cognitive consequences that are diminished through interpersonal identity disclosure and individual identity self-acceptance (Pachankis, 2007).

Keeping secret a devalued social identity may also lead to feelings of shame, fear of rejection, psychological distress, and general negative affect (Pachankis, 2007). In the absence of disclosure, close interpersonal relationships may be marred by anxiety and guilt, and the stigmatized individual is likely to engage in negative self-evaluation, feel reduced self-efficacy, and experience identity ambivalence (Pachankis, 2007). Importantly, concealing the stigmatized identity prevents the individual from experiencing social interactions that are welcoming and affirming rather than rejecting (Pachankis, 2007). The effect of concealing a stigmatized identity, and the process of disclosure and identity acceptance, is especially relevant to telephone

counseling in which other social context cues for LGBT stigma may not be readily apparent. An intentional identity assessment that facilitates disclosure of a stigmatized identity, coupled with an affirming relationship during telephone counseling, may sustain engagement for LGBT individuals seeking telephone-delivered tobacco treatment.

Stigma is persistent (Link & Phelan, 2001), and stigmatized individuals experience negative impacts, particularly through a weakened or depleted ability to regulate emotions and behaviors (Hatzenbuehler et al., 2009; Inzlicht, McKay, & Aronson, 2006). Possessing a stigmatized identity may also expose an individual to vicarious stress from witnessing stigma enacted against others who share their identity (Miller & Kaiser, 2001). This depletion of self-control may lead to negative health outcomes including psychological distress, substance use including smoking tobacco, and increase perceptions of minority identity stress (Hatzenbuehler et al., 2013).

However, stigmatized individuals are not simply victims of stigma, but rather actively engage in resisting the devaluing of their identities. Individual level resistance includes concealing the stigmatized status, educating others about the impact of stigma, avoiding stigmatizing people, challenging the devaluation, and using cognitive distancing (Link et al., 2014) such as attributing discrimination to stigma (Major & O'Brien, 2005; Miller & Kaiser, 2001). Some individuals may also strive to overcome the stigma, increase their group identification, and participate in social movements or collective action to reduce stigma (Major & O'Brien, 2005; Miller & Kaiser, 2001). Ultimately, social change is needed to remove the motivation to stigmatize (remove the social salience), or to limit the exercise of power over minority individuals through protective laws, policies and institutional practices (Link & Phelan, 2001).

The stigma of smoking. The behavior of tobacco smoking has become a stigmatized marker in the current North American sociocultural environment. The physicality of smoking tobacco is an exhibition of habitus symbolizing the smoker social position (Bourdieu, 1989). The physical embodiment of smoking is recognizable by others as belonging to the smoker status, with many attendant stigma markers such as having low education, living in poverty, having mental illness, or simply being dependent on a substance that has become socially unacceptable (Collins, 2004; Graham, 2011). Accepting the social meaning ascribed to the smoker identity may increase the identity salience (Stryker, 1968), while reinforcing the 'otherness' of concurrent stigmatized identities such as being LGBT (Craft & Lee, 2002; Stuber et al., 2008).

The social context of tobacco use further entrenches the individual smoker's social status. The form of tobacco smoked such as cigars, pipes, or cigarettes, where one smokes, and with whom, are intimately linked to social position and cultural resources (Poland et al., 2006). Smoking is deeply embedded into collective behaviors within social structures, wherein the patterns of tobacco consumption reflect the available means to construct a social identity (Poland et al., 2006). At the same time, the social movement towards anti-smoking and efforts to de-normalize tobacco use threaten a social role, and tobacco control advocates need to also recognize smoking as a social activity within social location and structures. Understanding that tobacco use is not a random event occurring within society, but rather intricately symbolizes the organization of society and the meaning within social structures is integral to reducing disparities in tobacco smoking. Tobacco control efforts that increase the stigma of use, should simultaneously enhance efforts to build self-efficacy and reduce defensive reactions in tobacco users (Evans-Polce, Castaldelli-Maia, Schomerus, & Evans-Lacko, 2015).

As public health agencies have used strategies to denormalize and reduce tobacco use in the general population, there is growing concern about the ethical use of efforts that have increased stigma for tobacco use (Bell, Salmon, Bowers, Bell, & McCullough, 2010; Evans-Polce et al., 2015). The stigmatizing effect of the effort to denormalize tobacco use can be seen in the decreased identification with the smoker identity among young adults with higher education who use tobacco non-daily or intermittently (Guillory, Lisha, Lee, & Ling, 2017; Kingsbury, Parks, Amato, & Boyle, 2016). A recognition of tobacco use disparities for vulnerable social groups illustrates the importance of redressing social inequity and maintaining vigilance towards the power imbalance between the government agencies that stigmatize tobacco use, and the individual tobacco user (Bell et al., 2010). Tobacco-stigmatizing anti-smoking messages may have the opposite of the desired effect by lowering cessation intention among individuals with low-income or low self-efficacy smokers due to emotions of shame (Kim, Cao, & Meczkowski, 2017). However, accepting smoking stigma may also serve to deflect attention from other stigmatized social status such as having HIV (Phillips, Rowsell, Boomer, Kwon, & Currie, 2016). Examining smoking as a stigmatized behavior, as well as a marker for other kinds of stigma, demonstrates the complexity of tobacco use in intersecting social locations and the potential pitfalls of efforts to reduce tobacco use with negative messages about tobacco.

2.2.2 Minority Stress

Minority stress theory uses elements of stress theory to describe the processes by which the social oppression and stigma of sexual minorities diminishes health (Dohrenwend, 2000; Pearlin, Menaghan, Lieberman, & Mullan, 1981). The stress process develops within a socioeconomic context (Pearlin, Schieman, Fazio, & Meersman, 2005) that exposes the individual to life

experiences and chronic strains, such as discrimination, as well as to social supports, and belief and value systems, that combined with personal resources either mediate or moderate the link between stressors and health (Dohrenwend, 2000; Pearlin & Bierman, 2013; Pearlin et al., 1981). Stress-induced illness results from an inability to adapt to the stress volume (Dohrenwend, 2000). In minority stress theory, stress on sexual minority individuals is a result of structural social disadvantage that includes prejudice, discrimination, or unfair treatment (Meyer et al., 2008). Structural stress, such as found in a hostile society for LGBT people, creates processes of internalized homophobia and perceived stigma, and may also include experiencing occurrences of violence (Meyer, 1995, 2003). Minority stress theory posits that for LGBT individuals these processes result in psychological distress, and other poor physical and mental health outcomes, that are not moderated by changes in social support or minority-specific coping, such as affiliation with minority culture (Meyer, 1995).

Minority stress theory posits that individual perceptions of stigma and the experience of prejudice in a hostile social environment creates stress that is unique, chronic, and based in social structures, with structural level stigma enacted through heterosexist social values and homophobic policy (Meyer, 2003). Among sexual minorities, this exposure to social stress results in higher levels of perceived stress (Meyer et al., 2008). In addition, the perception of minority stress may be heightened because stressors derive from or target identity (Thoits, 1999). While Meyer identifies and focuses on social structures as the driver of stress, Hatzenbuehler (2009) incorporates stress process theory (Pearlin & Bierman, 2013) to expand minority stress theory and explain how perceived stigma from the continuous onslaught of structural stressors is particularly noxious for sexual minorities.

The chronic cognitive, emotional, and social coping resources required in an attempt to adapt to a hostile social environment slowly deplete self-regulation over time. Within Hazenbuehler's (2009) psychological mediation framework, stigma 'gets under the skin' and the stress response is moderated by dispositional characteristics and social supports. Mediators of the psychological distress response include emotion dysregulation, a lack of social or interpersonal supports, and cognitive processes such as rumination. The additional stress derived from structural stigma leads to psychological distress and externalized problems, such as substance use, in the absence of an effective coping response (Hatzenbuehler, 2009). The externalized problems delineated in this psychological mediation framework correspond with the avoidant negative coping strategies described by Lazarus and Folkman (1984). The minority stress framework suggests the usual levels of adaptive resources in an average person may simply be insufficient to manage the increased stress from social structures (Meyer, 2003). Minority stress theory would suggest that for LGBT individuals stopping tobacco use may be more difficult than for non-LGBT individuals because of additive stress related to anti-LGBT social structures.

2.2.3 Impact of Stigma and Minority Stress

As reviewed above, the increased stress arising from LGBT identity and the perception of an unwelcoming social environment for LGBT people creates hypervigilance around the stigmatized identity that impacts health and smoking (Meyer & Frost, 2013). Few studies have been conducted that directly measure general stress among sexual minority populations. Meyer et al. (2008) found that sexual minorities compared to heterosexual individuals had increased stress exposure, particularly to expectations of prejudice, $B = 0.26$, $SE = 0.08$, $p < .01$, number of prejudice events, $B = 0.46$, $SE = 0.11$, $p < .01$, and large magnitude stressful events, $B = 0.59$, SE

= 0.28, p = 0.03. Similarly, using data from a nationally representative survey, Mays and Cochran (2001) found that compared to heterosexuals, sexual minority individuals reported more lifetime, OR = 1.82 [1.05, 3.16], and daily discrimination stress, OR = 2.42 [1.37, 4.26]. This increased lifetime and daily discrimination stress arising with LGBT identity was associated with increased prevalence of psychiatric disorders, with adjusted OR = 1.60 [1.29, 1.99] and 2.13 [1.69, 2.68] respectively (Mays & Cochran, 2001). Qualitative research with adult female smokers also found sexual minority women often reported tobacco smoking to manage stress and regulate emotions resulting from the unique stress of minority status and stigma (Gruskin, Byrne, Altschuler, & Dibble, 2008).

The impact of structural stigma has recently been shown to have a direct impact on smoking for LGBT people. Hatzenbuehler and colleagues (2014; 2011) created an index for anti-LGBT structural stigma composed of the geographic prevalence of same-sex couples, Gay-Straight Alliance social support programs for LGBT youth in schools, protective legislation including LGBT hate-crime and employment non-discrimination protection, and public opinion surveys about sexual minorities. In data collected in Oregon state, structural stigma was associated with sexual minority youth smoking, such that more supportive environments reduced the odds of smoking, OR = 0.92 [0.90, 0.94]. These findings were replicated nationally with three waves of longitudinal data in the Growing Up Today Study, finding similar estimates, OR = 0.97 [0.96, 0.99]). In a similar analysis with adults, current structural stigma predicted smoking among young sexual minority men, B=2.84 [0.99-4.70], and the interaction with individual stigma was suggestive, p = 0.09, although sample size precluded a definitive result (Pachankis et al., 2014). This provides compelling evidence that an individual's predisposition to stigma is highly influenced by the social environment in predicting smoking. Importantly, despite the

many harmful effects of stigma, early signs suggest that removing elements of structural stigma, for example by enacting equal marriage laws, may correspond with better health for sexual minorities (Hatzenbuehler, 2014); removing the ability to stigmatize is effective as predicted by stigma theory (Link & Phelan, 2001).

Finally, the current literature for the impact of minority stress factors on tobacco smoking is suggestive but inconclusive. In a review of associations between markers of minority stress and smoking, young sexual minority individuals appear to have an increased risk for smoking associated with victimization, but the links between victimization and internalized stigma to smoking are less clear for adults (Blosnich et al., 2013). However, stress process combined with life course theory suggests that chronic stress earlier in life may have long lasting impacts on health over the life course (Pearlin, 2010). This may help explain why LGBT tobacco smoking remains elevated with age despite adults becoming more self-accepting of a stigmatized identity. The overarching evidence suggests that the high rates of smoking among LGBT populations may stem from the multitude of early stressful experiences arising from a stigmatized social identity; outcomes of which continue to be manifest in adults.

2.2.4 Coping with Stigma and Stress

For LGBT people, the cultural narratives of stigma become internalized leading to expectations of social rejection that require significant coping resources (Meyer & Frost, 2013). This internalizing process can result in concealing a stigmatized sexual identity to avoid stress and stigmatization that simultaneously reduces the availability of social support (Hatzenbuehler, 2009; Meyer, 2003). Internalized sexual minority identity stigma has even been linked to being diagnosed with a health problem, OR = 3.47 [1.31, 9.16] (Frost, Lehavot, & Meyer, 2013),

demonstrating the cascade of effects of stigma stress. Similarly, concealing a stigmatized sexual identity has been linked to higher levels of cortisol, within 30 minutes of awakening, F (1, 41) = 9.14, p = .004 (Juster, Smith, Ouellet, Sindi, & Lupien, 2013), and a one standard deviation increase on an identity concealment measure increased odds of 1.24 for daily smoking (Pachankis, Westmaas, & Dougherty, 2011).

The impact and perception of stigma stress can be moderated by personal characteristics such as attribution styles and a personal sense of mastery (Dohrenwend, 2000; Link & Phelan, 2001; Pearlin & Bierman, 2013) and influences whether to enact an adaptive approach to deal with stress (Lazarus & Folkman, 1984). Among sexual minority adults, attribution styles, such as how individuals assign psychological weight to discriminatory events, have been shown to moderate the effect of discrimination on mental health, b = .16, p < .01 (Burns, Kamen, Lehman, & Beach, 2012). Successfully managing stress builds a sense of mastery (Pearlin & Bierman, 2013; Pearlin et al., 1981), and among older gay men a personal sense of mastery partially diminished, the mental health impact of minority stress, B=0.47, SE = 0.07, p < .001 (Wight, LeBlanc, de Vries, & Detels, 2012). Importantly, Meyer and colleagues (Meyer et al., 2008) further found no significant differences between sexual minorities and heterosexuals on levels of mastery for life stressors. These studies suggest that individual-level factors are being activated by sexual minorities to buffer the effects of stigma-stress. Instead, the excess of stress manifestations present in sexual minorities is likely to be a result of a higher allostatic load (McEwen & Wingfield, 2003) that diminishes that ability to enact positive coping (Dohrenwend, 2000) for minority stress processes.

Positive coping with stigma also includes enacting social networks of supportive peers and family to help mediate the impact of stress (Lazarus & Folkman, 1984; Link & Phelan,

2001). Among sexual minority individuals, coping with minority stress includes building and maintaining stronger affiliation and cohesiveness with the LGBT community, self-acceptance and disclosure of a sexual minority identity, and learning to manage with the associated structural stress (Meyer, 2003). Research with LGBT individuals has found associations between increased tobacco smoking and decreased family support, OR = 2.44 [1.47, 4.06] (Rosario et al., 2014), decreased smoking with increased religious affiliation, OR 0.87 [0.80, 0.94] (Rostosky, Danner, & Riggle, 2007), and decreased smoking with supportive schools and neighborhoods, OR = 0.92 [0.90, 0.94] (Hatzenbuehler et al., 2011). While this suggests that tobacco smoking could supplant decreases in social support, intriguing findings also show that as minority distress decreases with affiliation and support from the LGBT community, smoking may actually increase (Holloway et al., 2012; Wright & Perry, 2006), possibly related to high prevalence and a perception of normative tobacco use. The overall impact of stigma and minority stress suggests that LGBT-identified individuals who smoke tobacco may be less inclined to access the quitline, less engaged in treatment and less successful with stopping smoking. However, promoting the quitline as identity-affirming, and providing care delivered over the telephone that facilitates identity disclosure may sustain treatment engagement and reduce perceptions of LGBT stigma. A reduced stigma environment for tobacco treatment delivered through quitlines could result in equitable access, engagement, and cessation.

2.3 INTERVENTIONS: PROGRAMS, STRATEGIES, APPROACHES

2.3.1 Tobacco Interventions for LGBT Individuals

The literature on higher rates, particular risks factors, and treatment preferences suggest that LGBT-specific cessation interventions may be beneficial, however the efficacy of non-tailored interventions compared to tailored interventions for this population is a new area of study. Despite the growing literature base addressing the demographics and associated risks for smoking among LGBT individuals, few interventions have been published and few are available in grey literature, defined as not being peer-reviewed and/or published for a non-academic audience. Overall, these interventions have generally provided individual or group counseling, or community-based educational campaigns directed towards LGBT people (Baskerville, Dash, et al., 2017; Lee, Matthews, McCullen, & Melvin, 2014).

Interventions that have begun to specifically address LGBT smoking have typically adapted established treatment programs such as the American Lung Association's (ALA) *Freedom From Smoking* ®, or the National Health Service model in Britain, to an LGBT context. The core features of these group interventions involved cognitive, behavioral, and group strategies to address smoking and nicotine addiction, as well as a psychoeducation component for relapse prevention and use of smoking cessation pharmacotherapy. The adaptations included an LGBT-focus in written materials and group discussions, and material to address LGBT health concerns, such as HIV or hormone therapy (Eliason, Dibble, Gordon, & Soliz, 2012; Harding, Bensley, & Corrigan, 2004b; Matthews, Conrad, Kuhns, Vargas, & King, 2013; Matthews, Li, Kuhns, Tasker, & Cesario, 2013). Group discussions also dealt with triggers related to homophobia, resisting advertising, and the association of smoking with bar culture. The

interventions were delivered in LGBT community spaces by LGBT staff trained in the core cessation intervention program.

Participants reported a strong preference for the group format that offered social support (Walls & Wisneski, 2011), and one group intervention reported an increase in mental wellbeing among participants (Dickson-Spillmann, Sullivan, Zahno, & Schaub, 2014). The perceived importance of the groups for LGBT tobacco cessation may suggest that self-regulation is enhanced by reducing social exclusion (Baumeister, DeWall, Ciarocco, & Twenge, 2005). These findings also highlight the important opportunity to increase positive identification with a tobacco-free social group and provide an opportunity for comparisons among others in similar circumstances (Thoits, 2011); a key element of social support. Some studies explicitly included strategies to deal with homophobic stigma as part of the cessation curriculum (Eliason et al., 2012).

These ALA adapted programs reported widely varying quit rates at the end of treatment and across follow up (Figure 2.1), ranging from a low of 16% among HIV-positive African American sexual minorities (Matthews, Conrad, et al., 2013), to a high of 73% among a diverse group of participants (Walls & Wisneski, 2011), 32% in programs located in Chicago (Matthews,

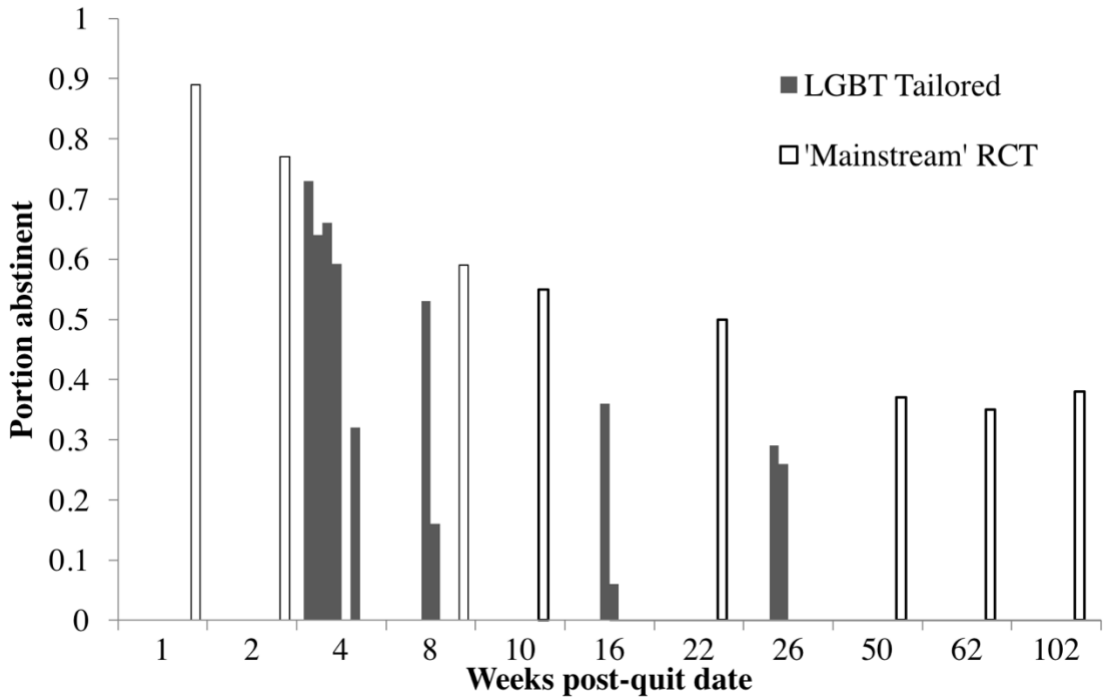

Figure 2.1. Cessation rates by weeks after target quit date in LGBT smoking cessation trials.

The proportion of the sample in each study reporting abstinence (y-axis) is illustrated by the number of weeks after the target quit date (x-axis). As target quit dates vary between programs, results are reported as weeks after target date to allow comparisons across programs. Bars within each week represent unique programs, and only LGBT participants are reported for 'Mainstream' interventions (white bars).

Li, et al., 2013), and 59% in San Francisco (Eliason et al., 2012). An abstinence rate of 60% is reported to be expected from the original intervention model delivered to non-LGBT populations (American Lung Association, n.d.).

Two studies adapted the UK National Health Service (NHS) withdrawal-focused group treatment program adapted for gay and bisexual men, with quit rates of 76% and 66% that the authors reported to be similar to the original NHS model (Dickson-Spillmann et al., 2014; Harding et al., 2004b). Adaptations included having the intervention delivered by gay men

trained in tobacco cessation, using "quit cells" of 3 or 4 individuals to increase reliability of peer support, education regarding use of bupropion with HIV anti-retroviral medications, assertiveness training to resist smoking, as well as tailoring discussion and program materials to a gay male cultural context. These groups also provided alternative smoke-free socialization outside of bars and clubs and had related benefits for increased mental wellbeing (Dickson-Spillmann et al., 2014).

Only two studies have *post hoc* compared heterosexual participants to LGBT participants in non-tailored controlled smoking cessation intervention trials. In these two studies of extended treatment for relapse prevention, sexual orientation identity was collected at baseline allowing an analysis of differences (Covey, Weissman, LoDuca, & Duan, 2009; Grady et al., 2014). Both interventions provided initial treatment for all participants using a combination of pharmacotherapy and counseling. While Covey and colleagues noted a faster time to relapse, they found no statistically significant difference in abstinence rates among gay or bisexual men compared to heterosexual men (59% and 57%, respectively) at the end of the initial phase 8-week treatment.

Grady and colleagues conducted a year-long intervention with one-year follow up measuring quit rates across multiple time points. Their study found no difference in quit rates between LGBT participants and heterosexual participants (38% and 40%, respectively) at the end of a two-year period. These non-tailored treatment studies suggest that providing smoking cessation intervention is beneficial regardless of differences in sexual orientation or gender identity, perhaps related to a destigmatizing effect resulting from explicitly acknowledging LGBT identity in treatment, but could also be related to selection bias of LGBT participants in these trials.

2.3.2 Community and Bar Interventions

Over the past decade, several municipalities have recognized that health departments, businesses and community organizations can address LGBT tobacco smoking (Legacy, 2012; Leibel, Lee, Goldstein, & Ranney, 2011) but few have published results in peer-reviewed literature. As a sole example, the CRUSH campaign used social marketing and branding to counter tobacco advertising using underwear models to promote smoking cessation and prevention messages (Fallin, Neilands, Jordan, & Ling, 2015). This intervention resulted in strong recognition of anti-tobacco messaging, and the authors report decreased LGBT smoking after one year, varying by exposure to the message, with the most exposed compared to the least exposed having reduced odds of 0.58 [0.42, 0.81] for current smoking.

Other community-based interventions reported without results include promoting cessation resources by offering photos of customers who smoke with male models that included a visible display of a cessation hotline number, enlisting bars in removing and refusing tobacco advertising and promotional items, and training former smoker drag show hostesses to refer community members for cessation services (Leibel et al., 2011). Projects available in 'grey' (not peer-reviewed, or non-academic) literature include the Mautner Project that developed a social marketing campaign with the slogan "Delicious Lesbian Kisses" to promote the idea that non-smokers are more desirable among lesbian women. The campaign used posters, postcards, and small trinkets to promote the product of smoke-free people (Legacy, 2012). Finally, the *Tips* campaign was delivered to a mass audience that included LGBT people. Preliminary data from the Pennsylvania Department of Health, illustrated in Figure 2.2 showed that calls from LGBT people increased during the first two campaigns compared to the same time period in 2011.

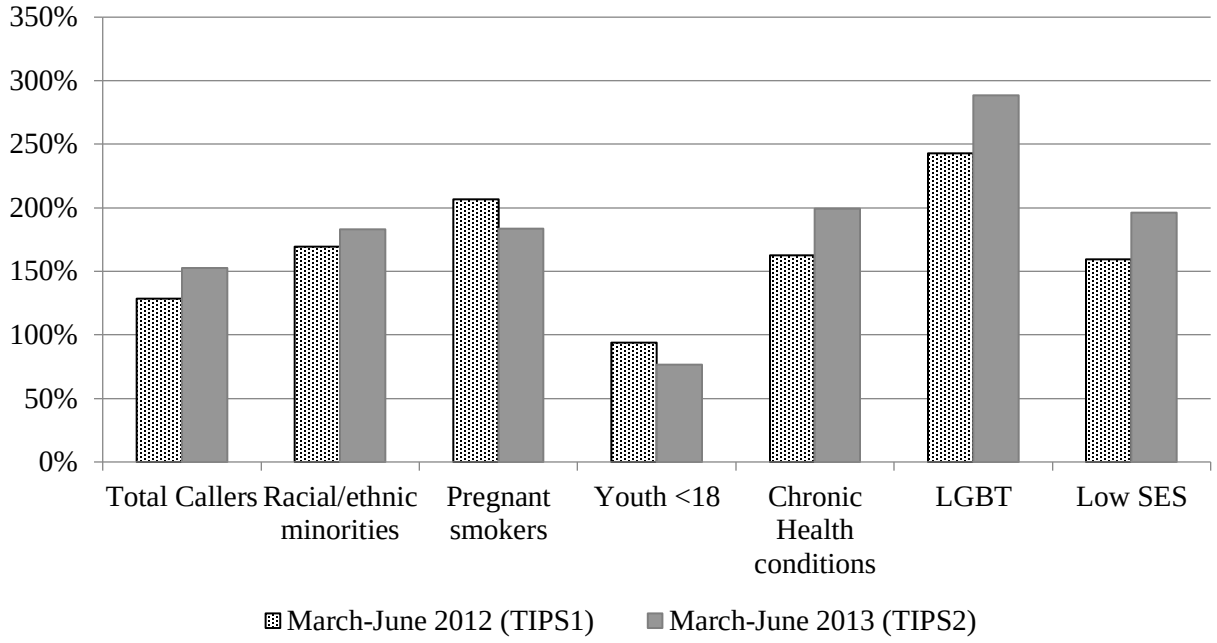

Figure 2.2. Increase in callers to the quitline during the *Tips* campaign.
The percentage increases illustrated were calculated in each category compared to the baseline year using data provided by the Department of Health, Division of Tobacco Control and Prevention.

2.3.3 Intervention Designs

The evidence base for treating tobacco among LGBT people is limited, as reviewed above. The published program reports that specifically aimed to treat LGBT tobacco smoking are all limited by single group uncontrolled study designs, that affects the internal validity of these studies for making inferences about cessation effectiveness. The two *post hoc* analyses conducted after treatment with a general population sample, with sexual orientation identity collected at baseline, have results with increased scientific rigor for understanding effectiveness. However, caution in

interpreting these results is necessary because individuals may conceal their stigmatized minority identity (Pachankis, 2007), and those who did disclose their identity may represent a biased sample of LGBT individuals who were more open and accepting of their identity. The community-level intervention resulted in strong recognition of the intended message, however the follow up survey was not conducted with the same individuals. This diminishes confidence in the findings of decreased tobacco use with increased intervention exposure as a direct result.

2.3.4 Populations

Many of the reports of cessation interventions for LGBT populations are limited by a small number of participants and by the over-representation of male participants, whereas sexual minority women have the same tobacco use rates, but have a greater tobacco smoking disparity when compared to women in the majority population (Jamal et al., 2016). Women and racial/ethnic minorities are vastly underrepresented in these studies, with sample populations that were majority white, male, with at least some college or higher education, and employed. Table 2.1 compares the demographic profiles of participants across the eight studies. Of note, sexual orientation is theorized to involve elements of identity, attraction, and behavior (Sell, 2007), and as a result, while the identity construct is likely most relevant to the discussion of cessation interventions, it is not possible to know whether the samples in the studies are representative of sexual minority smokers generally, limiting the applicability of these findings. Additionally, few interventions collected gender identity and the very small sample of gender minority individuals limits our understanding of the efficacy of interventions for this separate group.

Table 2.1

Participant Demographics in Studies of LGBT Cessation Interventions, %

Study	*N*	Age (*SD*)	White	Male	College Education	Employed	End of Treatment Abstinence
1	69	37.1 (7.2)	90	100	64	75	64
2	54	37.7 (9)	76	100	85	100	59
3	44	35.5 (12.3)	55	41	27	70	73
4	233	44.7 (11.9)	56	74			59
5	31	45.7 (8.5)	0	100		26	
6	198	40.5 (9.2)	70	61	58		32
7	70	43 (9.7)	86	100	13		66
8	136	46 (11.3)	75	75	86	68	55
9	1892	25.2 (2.7)	27	75	29		

Note: Studies in order they appear: 1) Harding et al; 2) Covey et al; 3) Walls & Wisneski; 4) Eliason et al; 5) Matthews, Conrad et al; 6) Matthews, Li et al; 7) Dickson-Spillmann et al; 8) Grady et al; 9) Fallin et al. Blank cells indicate data were not reported.

2.3.5 Outcome Measurement

Outcome measures were consistently collected within each treatment study, however the type of measure varied substantially across the eight studies. Abstinence outcomes in these studies were reported at the end of treatment generally between four and nine weeks after the target quit date; a typical time frame for end of therapy and short-term follow up (see Figure 2.1).

The measures of tobacco abstinence in these studies is suboptimal due to a reliance on self-reported outcomes, and participants in smoking cessation interventions may report abstinence even during periods of relapse or after a failed quit attempt (Regan et al., 2016). To address these 'false positives' and to obtain long-term efficacy data, biochemical validation using carbon monoxide (CO), cotinine, or anatabine/anabasine is recommended for a more accurate assessment at six or 12 months after the target quit date (Benowitz et al., 2002; Hughes et al., 2003). Five of the studies used the aid-to-cessation trials recommended self-reported point-prevalence or continuous abstinence with at least one biologically-confirmed time-point (Covey et al., 2009; Dickson-Spillmann et al., 2014; Grady et al., 2014; Harding et al., 2004b; Matthews, Conrad, et al., 2013). The remaining studies reported only self-reported point-prevalence abstinence, which reduces the strength of cross-study comparisons for abstinence rates. Only three studies reported at least six-month abstinence, a recognized marker for long-term cessation and treatment efficacy. Finally, although smokers were the target of the community-level intervention, it is possible that non-smokers were more likely to recognize exposure to the intervention, thus biasing the effect towards a lower smoking prevalence.

2.4 SIGNIFICANCE TO SOCIAL WORK

The traditional foci of practice and social work values (National Association of Social Workers, 2008) in individual mental health and substance use, social justice for marginalized groups, and concern for impoverished and other socially marginalized populations, coincides with the demography of current tobacco smoking. However, social work has been remiss in attending to the use of tobacco as a social problem, despite growing research into the sociodemographic

profile of current tobacco smoking that illustrates why the discipline ought to pay more attention to this catalyst of human suffering. A search of literature in English language social work journals from the *Social Work Abstracts* database from 2006 – 2016 revealed only 31 articles with tobacco, cigarette, smoking, or nicotine in the title or abstract. Of these articles, just 20 addressed tobacco as the primary research problem while the remaining included tobacco smoking as either a covariate in health research, or as one of several outcomes in substance abuse research.

While LGBT people face a rapidly changing social environment that has seen monumental changes in the laws, policies, institutional practices, and public attitudes (Human Rights Campaign, n.d.), many LGBT people do not have access to identity-affirming experiences without moving to large urban environments away from their social networks. Additionally, because these changes are recent, many of the accumulated effects of stressors are likely to continue as health disparities for an extended period into the future (Link et al., 2014; Pearlin et al., 2005). Social work can bring a unique perspective to the study of tobacco smoking disparities for LGBT people, by incorporating the *person in environment* perspective to illuminate the social causes and solutions for this deadly epidemic (Wheeler & Dodd, 2011).

Social workers bring a unique perspective to the intersection of health and social problems, and can bring this perspective to the study and practice of tobacco control with LGBT people. The social work values of social justice and a belief in the inherent value and dignity of each individual is translated into standards for practice that include at their core, cultural competence (National Association of Social Workers, 2015). Beyond cultural competence, that may be misconstrued as an achievement, cultural humility embodies much of the same goals, but further identifies the practitioner as the learner and the person receiving service as holding

cultural knowledge. Cultural humility requires from the practitioner or researcher a commitment to self-evaluation and learning, to redress power imbalances, and develop equitable partnerships with the population served (Tervalon & Murray-Garcia, 1998). In particular, for LGBT people who smoke tobacco, cultural humility is required to understand the unique intersectional experiences of LGBT people (Crenshaw, 1991) in an often unwelcoming social environment, but also recognize the commonalities of the human experience in the need for equitable services, social justice, and individual dignity. Social workers have a responsibility to expand cultural competence and to establish cultural humility through interdisciplinary leadership; particularly in tobacco control and tobacco use disparities that are multifaceted problems of policy and practice. This unique social work perspective and the recognition of cultural humility are necessary to address the social and structural stigma and discrimination that underlie LGBT tobacco disparities.

In addition to the social work values and practice standards, social workers are well suited to address LGBT tobacco disparities because of our broad spectrum of practice settings. Social workers assist clients at the micro (individual), mezzo (families and organizations), and macro (community and policy) levels (National Association of Social Workers, 2015). Social workers recognize that social and health problems must be addressed not only at the intersections of identity and experience, but also the intersections of practice settings; for example, social workers may seek to change the impact social structures and policies have on individuals through community organizing. For LGBT tobacco use disparities, social workers can assist individuals to stop smoking using evidence-based strategies (micro); work with health care organizations to recognize the unique concerns of LGBT people who smoke, and help families and schools support and affirm LGBT identity development (mezzo); as well as mobilize the LGBT

community to combat tobacco industry tactics, advocate for policies that prevent tobacco use initiation, and research the impact on LGBT people of policy interventions (macro). Perhaps most importantly, beyond the study of health and social problems, social workers 'do' by working to address problems that affect the lives of vulnerable people.

Tobacco smoking is a problem that predominantly affects socially vulnerable populations, and in particular disproportionately impacts LGBT people compared to the general population. In addition, the dearth of social work scholarship on this important confluence of a health and social status indicator highlights a tremendous opportunity to enhance the presence of social work in the field of tobacco prevention, policy, and treatment.

2.5 SUMMARY

LGBT tobacco use is multifaceted in etiology and has multiple factors that are associated with this tobacco use disparity. The higher rates of tobacco smoking among LGBT people exists within a sociocultural environment the stigmatizes sexual and gender minority identities. While effective interventions for tobacco use exist and feasibility of LGBT interventions has been demonstrated, research has not explored whether large-scale interventions, including quitlines and mass media campaigns, are equally effective for LGBT people. This dissertation begins to address an important knowledge gap in the treatment of tobacco smoking among LGBT people.

3.0 METHODS

3.1 DESIGN

Multiple data sources and methods were used in this project to examine access, engagement and treatment of tobacco use for LGBT adults calling a telephone quitline. Access to the quitline (Aim 1) was assessed using prospective observational data collected 1) from an inpatient tobacco treatment service quality improvement database and associated electronic health record with a provider-initiated quitline referral process, and 2) using an anonymous cross-sectional survey in a primary care clinic tailored to serving LGBT patients. Data from inpatients was collected under an approved expedited protocol (IRB# PRO17060544), and data collected from an LGBT-tailored primary care clinic was approved as exempt by the University of Pittsburgh Human Research Protections Office (IRB# PRO17060540). Access to the quitline through mass media promotion was a secondary analysis of clinical data collected by the Pennsylvania tobacco telephone quitline. Here, the average weekly proportion of LGBT to non-LGBT callers, stratified by sex, was compared between the period preceding the *Tips* campaign, to the period during the campaign in an observational research design.

As an evaluation of data that has already been collected, the research design for engagement (Aim 2) in telephone counseling calls and medication treatment and cessation outcomes (Aim3) is an observational, quasi-experimental, program evaluation. Callers

identifying as LGBT were compared to callers who identify as straight (heterosexual) and cisgender. LGBT callers were matched to non-LGBT callers using propensity scores to achieve balance in group size and on covariates, then treatment engagement and cessation outcomes were compared between groups. The analysis for Aims 2 and 3 were stratified by sex (male/female). The University of Pittsburgh Human Research Protections Office approved the research using quitline data as exempt (IRB# PRO17110150). The methods for each aim of this dissertation study are further outlined below.

3.2 RESEARCH QUESTIONS

The questions for this study relate to access including receipt of a referral, engagement with, and treatment of smoking by telephone quitlines for LGBT callers compared to non-LGBT callers.

Aim 1: A major source of referrals to quitlines is provider-initiated referrals during healthcare interventions in hospitals and primary care settings for individuals who smoke. Self-referral to telephone quitlines remains the primary method by which individuals are connected to treatment, and the *Tips From Former Smokers (Tips)* mass media intervention was designed to increase awareness of, and thus calls to, state quitlines. The effect of referral sources for LGBT patients was assessed by asking:

1) *Are referral patterns of post-discharge tobacco cessation care for LGBT patients different from non-LGBT patients from an academic teaching hospital with a tobacco treatment service?*

Unmasking concealed stigma by offering patients the opportunity to self-identify as LGBT, was expected to have a pro-equity impact on referrals to the quitline. Therefore, patterns of referral to

quitlines were expected to be similar for both LGBT and non-LGBT identified hospitalized patients.

2) *What are the associated characteristics of LGBT patients who would accept a quitline referral in a primary care clinic with a primarily LGBT patient population?*

The question of characteristics associated with accepting a hypothetical quitline referral was exploratory and hypothesis generating, and is important for identifying additional points of access to quitlines.

3) *Did the Tips mass media campaign have a different impact on increasing calls from LGBT callers to the quitline?*

Recognition of anti-tobacco messaging in mainstream media sources suggests that LGBT populations are exposed to *Tips*, and the reach of *Tips* was expected to be equitable because it is designed for mass consumption by populations who use tobacco. Initial data from Pennsylvania (Figure 2.2) suggested that LGBT callers had increases in calls during the first two rounds of the campaign. The effect of the *Tips* campaign was expected to continue across additional campaigns resulting in a proportional volume of LGBT callers to quitlines.

Aim 2: There are two primary questions related to the engagement of LGBT callers by quitlines:

1) *Do quitlines have a population-proportional reach for LGBT callers?*

This question sought to determine whether the proportion of current tobacco users in Pennsylvania who identify as LGBT correspond with the proportion of quitline callers who identify as LGBT. Given the impact of stigma and the associative link to smoking and research demonstrating low intent to call, proportionally fewer LGBT callers were expected to call the quitline.

2) *Do quitline interventions have different effects for engaging LGBT callers and heterosexual callers in proactive counseling sessions, and using medications?*

Similar to referring patients to quitlines, providing an opportunity for LGBT callers to self-disclose as a sexual or gender minority identity unmasks concealed stigma and may increase the likelihood that LGBT callers will stay in treatment, and thus use both telephone counseling and receiving medications in equitable proportions to non-LGBT callers.

Aim 3: The primary question related to treatment outcomes for LGBT callers by quitlines is:

1) Do quitline interventions have different effects for facilitating successful cessation seven months after the intervention for LGBT callers?

Research suggests that LGBT people may have higher relapse rates to smoking because of persistent structural stigma, higher exposure to important or significant others smoking in a community with higher smoking rates, and socialization effects. Thus, smoking cessation rates at seven months were expected to be lower for LGBT quitline callers.

3.3 POPULATION AND SAMPLE

3.3.1 Aim 1

The first question in examining quitline access sampled from a population of hospitalized patients who reported their smoking status upon admission, and were seen at the bedside by an inpatient Tobacco Treatment Service (TTS) at UPMC Presbyterian Hospital during their admission. TTS counselors received a daily list of all newly admitted patients who reported

current daily or non-daily tobacco smoking, or having quit in the past 12 months to an admissions nurse. Patients were offered a bed-side brief intervention consisting of a tobacco use history assessment, motivational enhancement, pharmacotherapy recommendations, and discussion of a quit plan after discharge (Ylioja et al., 2017).

TTS counselors were provided two hours of continuing education on LGBT terminology and tobacco disparities to facilitate integration of LGBT-specific knowledge into the tobacco treatment counseling session. This training included a module on differences of sexual orientation and gender identities, and instruction on how to assess LGBT-identity. During the counseling session, TTS counselors asked patients, "Do you identify as lesbian, gay, bisexual, or transgender?". If a patient responded affirmatively, the counselors were instructed to ask which identity(-ies) were relevant to the patient, and then to document the identity in the TTS quality improvement database and the medical record counseling note. Between August 9, 2017 and March 31, 2018, the TTS provided counseling to 2,639 adult patients, and assessed LGBT identity with 1,954 (74%), and only one patient refused to answer. For quitline referrals, the analytical sample was limited to patients who reported current smoking in the past 30 days, responded to the LGBT identity question, and who had a quitline referral status, N = 1,744, of whom 41 (2%) of reported an LGBT identity.

The second question and data source for assessing access to the quitline was sampled from the population of patients attending a primary care clinic specializing in the care of gay and bisexual men. Patients were offered a voluntary pen-and-paper survey upon check-in by registration staff. Although staff were initially instructed to offer each patient the survey and place blank surveys in with the completed surveys, not every patient agreed to take the paper survey, and staff only retained the completed surveys. As a result, a response rate could not be

calculated. Between August 3, 2017 and March 23, 2018, 170 patients completed the survey. Eight surveys were either duplicate responses or indicated that they did not want to participate, and two did not provide sufficient information for analysis. A small proportion, $n = 8$, of the sample unexpectedly identified as both cisgender and heterosexual (that is, not LGBT), and these responses were retained to explore differences in sexual orientation identity, in line with the exploratory nature of this question within Aim 1. For quitline acceptability, the analytical sample was limited to patients who reported current tobacco smoking, $N = 106$ (66.3%).

The third question and data source examining access to the quitline included a sample of individuals who smoked cigarettes and called the Pennsylvania quitline before and during each of the 2012 through 2016 *Tips* campaigns. Permission was obtained from the Pennsylvania Department of Health, Division of Tobacco Control and Prevention (J. Ochs, personal communication, November 7, 2017) to analyze quitline data, and data were retrieved from the Pennsylvania-contracted agency Public Health Management Corporation. The analytical sample was limited to callers for the eight weeks before, and the period during each *Tips* campaign from 2012-2016; a total of six campaigns. Individuals with multiple intakes who called both pre- and during the campaign were defined as calling in the pre-campaign period.

3.3.2 Aims 2 and 3

The quitline caller population was represented by a convenience sample of adults who smoked cigarettes and called the quitline for cessation assistance during years 2012-2014 in Pennsylvania. Quitline engagement and outcomes data were limited to callers with intakes in calendar years 2012-2014 to ensure comparability of data, as the LGBT identity question was changed beginning in 2015 and quit coaches received additional training on LGBT disparities in

2015 (A. Lukowski, personal communication, April 17, 2017). For callers with multiple intakes, only the first chronological intake was retained. Inclusion in the sample for quitline engagement outcomes was limited to callers (1) age 18 years or older, (2) who reported smoking one or more cigarettes daily, (3) agreed to be contacted in follow up, and (4) provided their sexual orientation and gender identity, yielding a sample of N = 39,218 individuals (Aim 2). Inclusion in the sample for quitline cessation outcomes additionally required callers to have (5) self-reported 30-day tobacco use status during the follow-up call, for an analytical sample of N = 6,318 individuals (Aim 3).

State-level LGBT population proportions were estimated using the Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS) sexual orientation identity question from the subpopulation of respondents who reported current tobacco use. Data were pooled across years that included sexual orientation identity questions (2014-2016) to obtain more precise estimates. BRFSS data was retrieved electronically from The Centers for Disease Control and Prevention (Centers for Disease Control and Prevention, 2015).

3.4 VARIABLES AND INSTRUMENT

3.4.1 Aim 1 - 3: Sexual Orientation and Gender Identity

Sexual orientation and gender identity is an intake question for the Pennsylvania quitline and was collected by National Jewish Health (NJH). During the intake process, callers were asked, "Do you consider yourself to be one or more of the following: a) Straight, b) Gay or Lesbian, c) Bisexual, or d) Transgender. e) You can name a different category if that fits you better." This

question was used to define the population of interest and the primary independent variable for analysis. All non-heterosexual or cisgender categories were collapsed as LGBT for analysis to increase sample-size in gender-stratified analyses.

In 2015, the quitline updated their sexual orientation and gender identity question to a two-part question to allow individuals to opt-out of answering, and based on feedback from callers and telephone counselors. Individuals are now asked first if they identify as gay/lesbian, bisexual, or transgender, then if yes, the specific identity is collected, with the option to specify any other sexual orientation or gender identity not listed. For the inpatient sample (Aim 1), the TTS counselors asked the two-part sexual orientation and gender identity question with hospitalized patients, with the option for patients to describe their identity. All identities reported as non-heterosexual or cisgender were collapsed as LGBT for analysis due to small sample sizes, and to prevent identification of the small number of individuals with non-categorized identities.

Patients in the primary care clinic were asked to identify their sexual orientation and gender identity with several presented options, including a space to specify another not-listed identity by writing in their preferred identity term. Non-categorized identities were collapsed into a single category due to small cell sizes, and to prevent identification of the small number of individuals with non-categorized identities.

3.4.2 Aim 1: Access to the Quitline

Referrals in healthcare settings. Acceptance of referral to the quitline after hospital discharge for inpatients was documented (yes/no) by a TTS counselor and extracted from a structured data field in the patient's electronic health record (EHR). Additional sociodemographics,

Table 3.1

Select Variables from Electronic Health Record, Primary Care Clinic Survey, and Minimal Data Set

Data	Variables
	Electronic Health Record (EHR)/Quality Database
Demographics	age (years), sex (male/female), race (White, African American, Other), insurance type (commercial, public, none), sexual orientation (LGB, heterosexual)
Hospitalization	length of stay (days), smoking-related diagnosis (yes/no), tobacco history (daily/nondaily; # cigs/day: >10/=<10)
Inpatient Treatment	minutes of TTS counseling, smoking cessation medication order or used during hospitalization (yes/no)
Referral to Quitline	Accept quitline referral (yes/no)
	Primary Care Clinic (PCC)
Demographics	Age (years), gender (male/female/trans), natal sex (male/female), sexual orientation (LGB, heterosexual), education (high school or less), insurance (commercial, public, none)
30 day smoking status	Daily, some days, former, never
Heaviness of smoking	# cigarettes per day, minutes to first cigarette after waking (<5, 6-30, 31-60, 60+)
Tobacco treatment history	Counseling, medications used, quit aids used (yes/no)
Treatment use acceptability	Plan to use quitline (yes/no), likelihood of accepting provider referral (5-point Likert), accept referral today (yes/no)
	Minimal Data Set (MDS)
Treatment Engagement	# calls; nicotine replacement therapy, evidence-based counseling, guideline-based treatment (yes/no)
Cessation Outcome	Self-reported 30-day abstinence (yes/no)
Demographics	Age (years), sex (male/female), education (less than high school, high school, some college, 4-year college), race (White, African American, others), ethnicity (Hispanic), insurance (Medicare, Medicaid, Private, Other, None), employment (employed, not employed, not seeking work), marital status (married, single)
Household characteristics	State geographic region (8 areas), live with person who uses tobacco (yes/no)
Heaviness of smoking	# cigarettes per day, minutes to first after waking (<5, 6-30, 31-60, 60+)
Tobacco history	Age of initiation (years), quit attempts (0, 1-2, 3-4, 5+), menthol use (yes/no), years duration of use (0-5, 6-9, 10-19, 20-29, 30+), motivation to stop (5-point Likert), difficulty to not use (yes/no)
Health status	Smoking related disease, mental health conditions, emotional health challenges (yes/no)

hospitalization, tobacco use, and inpatient tobacco treatment characteristics (Table 3.1) were extracted from the EHR to evaluate the associated characteristics of accepting a quitline referral. Daily smoking and cigarettes per day were used to provide a measure of dependence, as time to first cigarette was inadequately captured in the inpatient sample. A smoking-related discharge diagnosis was defined by presence in the patient discharge record of any one of the ICD-10 codes reported by the Surgeon General (Table 12.1), corresponding to malignant neoplasms, cardiovascular diseases and respiratory diseases (U.S. Department of Health and Human Services, 2014).

For patients in the primary care clinic specializing in care for gay and bisexual men, three questions assessing acceptability of the quitline as a cessation resource were asked including plan to use the quitline during the next quit attempt (yes/no), likelihood of accepting provider-initiated quitline when ready to stop smoking using a Likert scale, ranging from 1(*very unlikely*) to 5(*very likely*), and acceptance of a hypothetical referral during their current appointment (yes/no). Sociodemographics, and tobacco use characteristics (Table 3.1) were surveyed to evaluate any associated characteristics with accepting a hypothetical quitline referral.

Tips campaign. Access to the quitline during the *Tips* campaign was defined as a documented intake call by the quitline provider.

3.4.3 Aim 2 - 3: Reach and Proportionality

The proportion of LGBT people in the state population was assessed using the representative state-level population data from the BRFSS survey using pooled data from 2014-2016, the first years LGBT identity was asked in Pennsylvania, to obtain more precise estimates of the LGBT population. The small sample of LGBT respondents in any given survey year produced wide

confidence limits on estimates that were reduced when data were pooled over multiple years. The final person weight variable included in the BRFSS data was used to adjust for probability of selection, non-response bias, coverage errors, and for state-level population characteristics (Centers for Disease Control and Prevention, 2015). The combined weight variable was divided by the number of survey years to match the average state population over survey years. From the subpopulation of respondents who reported current smoking, the proportion who identified as LGBT was then estimated, stratified by sex, and was used to evaluate the proportional reach by the quitline.

3.4.4 Aim 2 - 3: Minimal Data Set (MDS)

Quitline variables were drawn from the Minimal Data Set (MDS) collected by every state quitline. The MDS contains both standard (collected by every state) and optional (selected by individual states) intake and follow up questions (NAQC, 2012).

Tobacco treatment engagement. The MDS includes the services received by the caller documented by the quitline service provider. The number of treatment calls provided proactively (quitline-initiated) and reactively (caller-initiated) was summed to indicate the dose of counseling provided by the quitline, and analyzed as counseling treatment engagement. Nicotine replacement therapy (NRT) shipped to the caller was documented by the quitline, and used as a measure for medication treatment engagement. Pregnant females were excluded from the analysis for NRT because it is given only with medical permission and not every pregnant caller would have equal access to NRT as a result. In accordance with the evidence base for quitline interventions, two variables were created to represent receipt of evidence-based counseling

(EBC) (Stead et al., 2013), and guideline-based treatment (GBT) (Fiore et al., 2008): EBC was defined as three or more counseling calls (not including the intake call); GBT was defined as three or more counseling calls combined with NRT shipment.

Cessation. Cessation was defined by self-reported 30-day abstinence from all tobacco products during the seven-month follow up evaluation call. Electronic cigarettes were not included as a tobacco product during the period evaluated.

Demographic and tobacco use characteristics. The standard intake questions for demographics include sex, age, race and Hispanic ethnicity, education, insurance type, employment status, and marital status. Household characteristics included eight geographic regions in Pennsylvania, and whether the caller lived with someone who uses tobacco. Tobacco use characteristics are listed in Table 3.1. The number of cigarettes smoked per day and the time to first cigarette after waking were combined as the Heaviness of Smoking Index (HSI) (Kozlowski, Porter, Orleans, Pope, & Heatherton, 1994). The HSI is a measure of nicotine dependence and is predictive of cessation success. Additional characteristics included years of age at cigarette initiation, menthol smoking, five categories for duration of use (0-5 years, 6-9 years, 10-19 years, 20-29 years, 30 or more years), four categories for number of quit attempts (0, 1-2, 3-4, 5 or more), whether the caller had a quit attempt in the past year lasting 24 or more hours, motivation to stop (5-point Likert scale), and whether callers perceived not using tobacco as difficult. Health status indicators included self-report of smoking related illness (COPD, diabetes, cancer, heart disease, heart attack, stroke, high blood pressure), a history of a mental health condition (anxiety, depression, bipolar, alcohol/drug abuse, schizophrenia), or emotional health challenges (over the past two weeks feelings of excessive stress, feeling depressed or anxious).

3.5 DATA COLLECTION AND STORAGE

Aim 1: Inpatient data was collected by TTS counselors, and entered in a quality improvement (QI) database stored on an encrypted and password protected server. Patient EHR data was stored on this same server. The TTS QI data and EHR data were linked using a patient admission-specific unique identifier in this secure environment. No identifiable information was stored in this combined dataset. Patient data in the primary care clinic was collected manually and entered into a database stored on a secured server (Box). Aim 2 and 3: Data to evaluate the effectiveness of quitline interventions was already collected and de-identified by the state contracted agency. Quitline data was stored on an encrypted storage system at the University of Pittsburgh (Box) accessed on a password-protected computer.

3.6 DATA ANALYSIS

Patterns of missing data were assessed for significant patterns in multiple logistic regression models stratified by sex where a binary variable representing missing was created, then testing against other variables in the dataset. To avoid spurious significance during multiple comparisons and with a large sample size, significance was tested with a p-value < 0.001. For all variables, missingness was then treated as missing at random (MAR), with case-wise deletion in regression models. For all bivariate comparisons between two groups, categorical variables were analyzed using cross tabulations with either chi-square test or Fisher's exact test when cell-size was less than $n = 5$. The means of continuous variables were compared for equality using independent group t-tests for approximately normally distributed variables, and the Mann-

Whitney U-test if the continuous variable was not normally distributed. All analyses conducted using quitline data (Aim 1: *Tips*, Aim 2, Aim 3) were stratified by sex, with separate models constructed for males and females. Data were analyzed using Stata SE 15.1 (StataCorp, College Station, Texas).

3.6.1 Aim 1: Assessing Access to the Quitline

The associated characteristics with a quitline referral for hospitalized patients were analyzed using logistic regression with having accepted a quitline referral (yes/no) as the dependent variable and with LGBT identity as the primary independent variable. The logistic regression model was adjusted for differences by sexual orientation in demographic or hospitalization characteristics using a forward selection model building process with a $p < .15$ cut-point (Bendel & Afifi, 1977; Hosmer, Lemeshow, & Sturdivant, 2013) to explore whether LGBT identity was independently associated with accepting a referral. For characteristics associated with accepting a referral in the primary care clinic, bivariate comparisons using logistic regression were assessed, then a multivariable logistic model was estimated to obtain an adjusted model of potentially important covariates using a forward selection model building process with a $p < .15$ cut-point. For both models, model specification was examined using Stata's link test to examine appropriateness of the logistic model. The link test refits the model with the predicted values and the square of the predicted values to explore whether the model has omitted variables or is not an appropriately specified as a logistic model. Goodness of model fit was assessed using the Hosmer-Lemeshow chi-square test with 10 groups, and influential and outlier observations were examined graphically. Models were refit without outlier observations to observe changes in model estimates, and accepted if there was changes in the direction or

magnitude of estimates. Sample size precluded sex-stratified analyses examining access to quitlines through referrals from health care providers.

The impact of the *Tips* campaign on increasing access to quitlines was assessed by comparing the proportion of LGBT-identified callers for the period of eight weeks prior to, and for the duration of, each *Tips* campaign from 2012 through 2016. The *Tips* campaign ran for 12 weeks in 2012, 16 weeks in 2013, two 9 week campaigns in 2014, 20 weeks in 2015, and 20 weeks in 2016. Because individuals could call the quitline and complete multiple intakes over each period under study, only the first intake during each period encompassing the pre-campaign and campaign duration was retained. As a result, individuals could be represented only once during any campaign, but could be included over multiple campaigns. The proportion of LGBT callers during the campaign period was compared against the proportion of LGBT callers during the pre-campaign period using a two-sample equality of proportions test, providing a *z*-score and *p*-value for the difference in proportions, with $p < 0.05$ considered a statistically significant difference.

3.6.2 Aim 2: Proportional Reach

Proportional reach of quitlines was evaluated using the two-sample equality of proportions test comparing the proportion of Pennsylvanians who reported smoking daily and identified as LGBT to the proportion of callers who completed a quitline intake in years 2014-2016, identified as LGBT, and reported daily smoking. The years used for this assessment differed from the quitline engagement and cessation outcomes, but were used to correspond with the same years of available state-level population data. The state-level proportion of respondents who reported daily tobacco smoking and who identify as LGBT was estimated using the

Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS) sexual orientation and gender identity questions. Pennsylvania began collecting LGBT identity in the 2014 BRFSS cycle. Data were pooled across years that included LGBT identity questions (2014-2016) to obtain more precise estimates, using the survey subpopulation commands in Stata. Estimates were adjusted to the state characteristics using the final sample weights provided in the BRFSS dataset, divided by the number of included years to account for pooled data.

3.6.3 Aim 2 - 3: Propensity Score Matching

Previous research on LGBT callers demonstrated there are differences between LGBT and heterosexual quitline callers (Lukowski et al., 2016), and the relative importance of these differences for quitline engagement and cessation is unknown. Additionally, LGBT callers are a small subgroup representing less than 5% of quitline callers in Pennsylvania. Testing treatment effects for a subpopulation required consideration of methods to adjust for the between group differences, as well as balance groups of callers on covariates in the absence of randomization. For quitline outcomes (Aim 2: engagement and Aim 3: cessation), all callers meeting inclusion criteria were retained with intakes from 2012-2014, and LGBT-identified callers were matched with non-LGBT callers using propensity score matching (PSM).

PSM is a method of sub-classification (Rosenbaum & Rubin, 1984) in data sets used to identify closely overlapping distributions of covariates in order to reduce bias between different defined treatment groups, rather than adjusting for differences in a regression model (Rubin, 1997). The model then relies upon the potential outcomes, or counterfactuals, to estimate the average effects of treatment in the two groups (Guo & Fraser, 2010). A counterfactual model has two major assumptions: The first is of ignorable treatment assignment, such that conditional

upon the covariates, treatment assignment is independent of the outcomes (Rosenbaum & Rubin, 1983). For the current study, this assumption means that sexual orientation and gender identity development are independent of quitline treatment engagement and tobacco cessation, when conditioned on any between group differences. The second assumption is the stable unit treatment value assumption, which requires that the quitline outcomes of an individual caller depend only upon their own sexual orientation and gender identity, and does not depend upon the identities of another caller (Rubin, 1986). This assumption also holds that presence of the LGBT callers does not alter the social or treatment environment in a way that alters the quitline outcomes for all callers. In the absence of violations of either assumption, proceeding with a PSM model allows estimation of the causal effects by treatment assignment, LGBT identity, using the quitline observational data.

PSM uses a logistic regression model with known group differences and theoretically important characteristics to predict treatment assignment (Guo & Fraser, 2010). Using the predicted logit score (range: 0-1), from the regression model equation, termed the propensity score, a control group is defined by matching each treatment group participant with one or more nearest neighbor control participants based on similarity of propensity scores. The model is iteratively adjusted until there is balance between groups on baseline covariates. After identifying the control group comparison match, the potential outcome for each treatment group subject is estimated using the average of the outcomes of similar controls. The difference between the observed and estimated outcome represents the treatment effect. In this study, assignment to the treatment group was defined as having an LGBT identity, in order to estimate the treatment effects of the quitline intervention for callers who identify as LGBT; the average treatment effect for the treated (ATET).

The PSM model was conducted using Stata's *teffects psmatch* command, with separate models conducted for male and female callers. The psmatch program command estimates the matching logistic regression equation, performs the matching, and estimates the ATET in a single command. The logistic model for matching was constructed using continuous variables and dummy variables for categorical variables, with the first category omitted as the reference group. Stata's matching algorithm uses the nearest-neighbor match on the propensity score, and reports independent and identically distributed standard errors that are adjusted to account for estimation (Abadie & Imbens, 2016).

The logistic regression model component of PSM predicting LGBT identity was estimated using all significant bivariate comparisons, $p < .05$. After conducting the PSM model, the matched participants were identified for the control group, and between group comparisons were iteratively tested until covariate balance was achieved. When covariate imbalance remained, additional matching with variables with between group differences $p < .15$ were included. Because the psmatch command does not provide fit and specification diagnostics for the regression matching model, the logistic regression model was tested separately for specification (using Stata command: linktest), the Hosmer-Lemeshow chi-square model goodness of fit test with 10 groups, as well as examination of outliers and influential observations, as described for Aim 1 logistic models. Once the final PSM model was determined and covariate balance was achieved, the PSM model was estimated with the outcome variables. The treatment effect of LGBT identity was estimated for the number of calls completed, receipt of evidence-based counseling, receipt of NRT, receipt of guideline-based treatment (all Aim 2), and 30-day self-reported cessation (Aim 3).

To correct for sparseness in categorical variables data, categories were collapsed from the original quitline data. The following categorical variables were recoded: race other than White or African American was categorized as all other; no insurance reported categorized as not insured; employment was categorized as (1) employed or student, (2) unemployed, or (3) not looking for work (homemaker, disabled, retired); marital status was recoded as either partnered or single; and tobacco duration less than one year was categorized with 1-5 years.

4.0 RESULTS

The results for the research project described above are presented by Aim, under the headings of Access, Engagement, and Cessation.

4.1 QUITLINE ACCESS: AIM 1

4.1.1 Hospital-Based Referrals

A total of 2,639 patients were counseled by the Tobacco Treatment Service (TTS) during the period under study between August 9, 2017 and March 31, 2018. Of these counseled patients, 1,954 (74.0%) were asked about their sexual orientation and gender identity, with only a single patient refusing to respond. Patients who were not asked about their identity were more likely to be male, report non-White race, not report current tobacco smoking (these patients have abbreviated counseling sessions), have a longer median length of stay, and not be discharged home (the latter two are surrogate markers of illness severity). Characteristics comparing inpatients who were assessed to those patients who were not asked about their sexual orientation and gender identity by the TTS during the bedside counseling session are displayed in Table 4.1. In this table, and in the tables that follow, percentages within a categorical variable column may

Table 4.1

Characteristics of Inpatients Assessed for Sexual Orientation and Gender Identity

	Not assessed		Assessed		
	n	%	n	%	*p*
N (%)	685	26.0	1954	74.0	
Age, mean, *SD*	50.3	15.5	50.2	14.4	.787
Sex, male	402	58.7	1031	52.8	.008
Race					.029
White	466	68.0	1431	73.2	
African American	148	21.6	371	19.0	
American Indian, Asian, Pacific Islander	8	1.2	11	0.6	
Declined/Not Specified	63	9.2	141	7.2	
Insurance					.090
Private/Commercial	156	22.8	526	26.9	
Public	508	74.2	1365	69.9	
Uninsured	21	3.1	63	3.2	
Length of stay, median, Interquartile range	4	5	3	3	.002
Disposition, home	533	77.8	1655	84.7	<.001
Current daily or non-daily smoking	589	86.0	1744	89.3	.022
Smoking-related discharge diagnosis	233	34.0	679	34.8	.765

Notes: $N = 2639$. Patients were assessed and treated by counselors at the bedside during hospital admission. Counselors asked each patient if she identified as LGBT during that assessment and documented the response. Reasons for not asking LGBT identity included insufficient time and appropriateness to the conversation.

add up to more than 100% due to rounding. The reasons for not asking a patient about her identity often included insufficient time in a brief intervention, the patient's current medical condition, or an inability to integrate the question into the conversation in a way that was sensitive to the patient, such as presence of visitors in the room.

In the sample of patients who reported current tobacco smoking and were eligible for treatment referrals, forming the analytical sample N = 1,744, 2.4% (n = 41) identified as lesbian, gay, bisexual, and/or transgender. There were no non-categorized identities provided by patients in this sample. Patients who self-identified as LGBT, compared to those who did not, were on average 11.3 years younger, t (1742) = 4.998, $p < .001$, but were otherwise similar in demographics, tobacco use, and tobacco treatment characteristics (Table 4.2). A referral to the quitline after hospital discharge was offered to 405 (23.3%) of counseled patients, including 13 patients (32.5%) who identified as LGBT; a referral rate that was higher but not significantly different (p = .161) from patients who did not identify as LGBT (23.0%). Based on the sample size for LGBT patients, the difference in referrals had power of .313 to detect a positive result, requiring at least 154 LGBT identified patients with 80% power for $p < .05$.

In multivariable logistic regression constructed using variables with a bivariate $p < .15$ and with LGBT identity as the primary independent variable, reporting an LGBT identity trended towards, but was not statistically significantly at $p < .05$, being related to accepting a quitline referral, odds ratio (OR) = 1.90, 95% confidence interval (CI) [0.96, 3.77], after adjusting for age, OR = 1.01 [1.00, 1.02] per year of increased age, a length of stay greater than the median, OR = 0.97 [0.77, 1.23], or reporting daily, OR = 2.20 [1.44, 3.35], rather than non-daily tobacco smoking (Table 4.3). The link test suggested that the model was appropriately specified as a logistic model, and the Hosmer-Lemeshow model fit test was good, χ^2 (8) = 8.85, p = .355.

Table 4.2

Demographics, Tobacco Use, and Tobacco Treatment Characteristics for Inpatient Current Tobacco Users by Sexual Orientation and Gender Identity

	Non-LGBT		LGBT		
	n	%	n	%	*p*
N (%)	1703	97.7	41	2.4	
Age, mean (*SD*)	50.2	14.3	38.9	14.8	<.001
Sex, male	870	51.1	22	53.7	.745
Race					.245
White	1233	72.4	26	63.4	
African American	342	20.1	9	22.0	
American Indian, Asian, Pacific Islander	10	0.6	0	0.0	
Declined/Not Specified	118	6.9	6	14.6	
Insurance					.813
Private/Commercial	444	26.1	10	24.4	
Public	1202	70.6	29	70.7	
Uninsured	57	3.4	2	4.9	
Length of stay, median (Interquartile range)	3	4	2	3	.096
Disposition, home	1445	84.9	38	92.7	.264
Smoking-related Discharge Diagnosis	589	34.6	13	31.7	.702
Smoking status, daily	1505	88.4	33	80.5	.122
Smoke > 10 cigarettes per day	794	47.6	16	39.0	.276
Quit attempt in past year					.240
Yes	455	26.7	8	19.5	
No	985	57.8	23	56.1	
Missing	*263*	*15.4*	*10*	*24.4*	
Plan to quit					.448
Quit or stay quit	1147	67.4	26	63.4	
Cut down	51	3.0	0	0.0	
No plan	505	29.7	15	36.7	

Table 4.2 (continued)

Smoking cessation medications					
Patient Refused offer	478	31.8	8	24.2	.358
Ordered for inpatient use	821	54.6	18	54.6	.999
Ordered for use after discharge	457	30.4	9	27.3	.702
Referred to quitline	392	23.0	13	32.5	.161

Notes: $N = 1744$.

Table 4.3

Logistic Regression Models for Characteristics Associated with Inpatient Quitline Referrals

Variable	Odds Ratio	95% CI	Adjusted odds ratio	95% CI
LGBT identity	1.61	[0.82-3.15]	1.90	[0.96-3.77]
Age	1.01	[1.00-1.01]	1.01	[1.00-1.02]
Length of stay greater than median (> 4 days)	0.98	[0.78-1.23]	0.97	[0.77-1.23]
Daily smoking	2.15	[1.41-3.28]	2.20	[1.44-3.35]
Intercept	0.30	[0.27-0.34]	0.09	[0.05-0.16]

Notes: CI = confidence interval. $N = 1742$.

Observations that graphically appeared to be outliers did not change the model fit or estimates in sensitivity tests and were retained in the final model.

4.1.2 LGBT-Tailored Medical Clinic

Survey data was collected from 170 patients in the LGBT-tailored primary care clinic, however a response rate could not be calculated because not every patient was provided the survey, depending on clinic flow and staffing, and not every uncompleted survey was returned, as was originally planned. Four surveys were identified as duplicated responses, four patients indicated they did not wish to take part, and two surveys contained insufficient data for analysis, leaving an analytical sample of $N = 160$. Patients who responded to the survey were on average 33.2 years old, $SD = 11.2$, 71.7% identified as cisgender males and 19.5% as transgender or gender non-binary, 61.7% identified as gay or lesbian and 19.1% as bisexual. Current tobacco smoking was reported by 66.7%, with 74.1% of current tobacco smokers reporting daily use. Patients who

reported current tobacco smoking were significantly different than patients who did not report current smoking in level of education, $\chi^2(1) = 4.88$, $p = .027$, income, $\chi^2(2) = 10.22$, $p = .006$, and insurance type, Fisher's exact $p = .018$. Table 4.4 illustrates the characteristics of the sample for respondents who did not report current smoking, and those who reported current smoking are further apportioned by acceptance of a hypothetical quitline referral.

Among participants who reported current smoking and also reported whether or not they would accept a quitline referral during their current visit ($n = 106$), 44.3% reported dual use of other tobacco products, such as smokeless tobacco, pipes, cigars, or electronic cigarettes, in the last 30 days. On average, participants reported an average Heaviness of Smoking Index (HSI) of 2.4 ($SD = 1.4$), representing a medium level of nicotine dependence. Most (74.3%) had made a quit attempt in the past that lasted at least 24 hours, with 16.0% having previously accessed counseling, either in-person, in a group, by telephone, or using an internet-based counseling resource, and 43.4% reported having used cessation medication.

Only 36.8% of respondents with current tobacco smoking were aware of the quitline as a cessation resource, and just 2.8% had previously called the quitline for assistance. Three questions assessing intention to use the quitline in the future included a plan to call the quitline during the next quit attempt (10.6%), a Likert scale assessing likelihood of accepting a quitline referral when ready to stop smoking, from 1(*very unlikely*) to 5(*very likely*), mean 2.7, $SD = 1.5$, and the primary variable of interest: willingness to accept a quitline referral during their current appointment (40.6%).

Characteristics that differed between patients who reported willingness to accept a referral compared to those who would refuse (Table 4.5), with a p-value <.15 included sexual orientation, $p = .048$ (Table 4.4), a plan to use medication to stop smoking, $p = .003$, a plan to

Table 4.4

Characteristics of Individuals Attending LGBT-Tailored Medical Clinic by Smoking Status, and by Quitline Acceptance

	No Current Smoking			Current Smoking				
				Accept Quitline [a]		No Quitline		
	n	%	*p* [b]	n	%	n	%	*p* [c]
N	54	33.3		43	40.6	63	59.4	
Age, mean (SD)	33.7	11.5	.729	34.6	11.6	31.5	10.3	.153
Sexual orientation			.096					.048
Gay/lesbian	31	57.4		25	58.1	43	68.3	
Bisexual	14	25.9		8	18.6	8	12.7	
Heterosexual	8	14.8		8	18.6	3	4.8	
Another identity	1	1.9		2	4.7	9	14.3	
Gender			.952					.291
Male	36	70.6		29	67.4	47	74.6	
Female	5	9.8		6	14.0	3	4.8	
Transgender	10	19.6		8	18.6	13	20.6	
Race			.390					.166
White	41	75.9		25	59.5	43	71.7	
Black	5	9.3		6	14.3	10	16.7	
Mixed/Other	8	14.8		11	26.2	7	11.7	

Table 4.4 (continued)

Education, high school or less	6	11.1	.027	13	30.2	14	22.6	.378
Relationship status, single	26	55.3	.809	26	60.5	35	55.6	.616
Household income			.006					.808
At or below median	25	46.3		31	68.3	43	68.3	
Above median	17	31.5		8	18.6	15	23.8	
Prefer not to say	12	22.2		4	9.3	5	7.9	
Insurance			.018					.228
Commercial	35	74.5		20	46.5	34	54.8	
Public	9	19.2		21	48.8	21	33.9	
None	3	6.4		2	4.7	7	11.3	

Notes: $N = 160$.

[a] Quitline referrals were hypothetical and not sent by clinic staff. [b] Comparisons between No Current Smoking and all Current Smoking. [c] Comparisons between Accept Quitline and No Quitline.

call the quitline during a quit attempt, $p = .027$, likelihood of accepting a quitline referral, $p < .001$, and willingness to accept a referral for a mobile technology intervention, $p < .001$.

A logistic regression model was created to examine all potentially important variables, $p < .15$, associated with accepting a quitline referral. Baseline odds ratios for each of the variables, and the adjusted odds ratios are presented in Table 4.6. The adjusted model with all five variables included had a non-significant square of the predicted value on the link test, indicating that the model was appropriately specified as a logistic model. The Hosmer-Lemeshow test demonstrated good model fit, $\chi^2(8) = 8.27$, $p = .408$. Observations that graphically appeared to be outliers did not change the model fit in sensitivity tests and were retained in the final model. The final model found that the adjusted odds of accepting a quitline referral were higher for individuals with a heterosexual identity, compared to a lesbian or gay identity, OR = 6.80 [1.15, 40.15], for individuals who were also willing to accept a referral for a mobile technology intervention, OR = 4.55 [1.52, 13.67], and for each point higher likelihood of accepting a provider initiated referral the adjusted odds increased by 2.28 [1.54, 3.37]. The adjusted model had an area under the receiver operating curve of 0.89, interpreted as having very good accuracy in predicting the referral outcome.

Table 4.5

Current Tobacco Use and Treatment Characteristics in LGBT Primary Care Clinic Patients by Quitline Acceptance

	Accept Quitline [a]		No Quitline		
	n	%	n	%	*p*
Heaviness of Smoking Index, mean (*SD*)	2.5	1.3	2.3	1.4	.516
Past 30 days other tobacco use	21	48.8	26	41.3	.441
Previous cessation medication use	20	46.5	26	41.3	.593
Previous cessation counseling	9	20.9	8	12.7	.257
Provider has recommended cessation	27	64.3	43	68.3	.673
Previous 24 hour quit attempt	34	79.1	44	71.0	.350
Aware of quitline	14	32.6	25	39.7	.455
Plan to use medication	25	58.1	18	29.0	.003
Plan to call quitline	8	19.1	3	4.8	.027
Likely to accept future referral, mean (*SD*)	3.6	1.3	2.1	1.4	<.001
Would accept texting/app referral [b]	34	79.1	21	33.3	<.001

Notes: [a] Quitline referrals were hypothetical and not sent by clinic staff. [b] Apps are programs for mobile computer devices such as smartphones or tablets. Referrals were hypothetical and not completed by clinic staff.

Table 4.6

Logistic Regression Model Testing Associations with Accepting Quitline Referral in LGBT Primary Care Clinic [a]

	Baseline odds ratio	95% CI	Adjusted odds ratio	95% CI
LGBT identity (ref: gay/lesbian)				
Bisexual	1.72	[0.57, 5.15]	1.63	[0.32, 8.38]
Other identity	0.38	[0.08, 1.91]	0.79	[0.12, 5.06]
Heterosexual	4.57	[1.11, 18.89]	6.80	[1.15, 40.15]
Plan to use medication	3.40	[1.50, 7.69]	2.20	[0.68, 7.16]
Plan to call quitline	4.63	[1.15, 18.6]	2.79	[0.48, 16.18]
Accept texting/app referral [b]	7.56	[3.06, 18.6]	4.55	[1.52, 13.67]
Likely to use quitline	2.07	[1.51, 2.83]	2.28	[1.54, 3.37]

Notes: CI = confidence interval.

[a] Quitline referrals were hypothetical and not sent by clinic staff. [b] Apps are programs for mobile computer devices such as smartphones or tablets. Referrals were hypothetical and not completed by clinic staff.

4.1.3 Tips From Former Smokers Campaign

Over several iterations of the *Tips* campaign, run annually from 2012 through 2016, the proportion of both male and female LGBT callers to non-LGBT callers was sustained from each eight-week pre-campaign period to the period representing the duration of the campaign (Figure 4.1). There were no statistically significant changes in the proportion of LGBT callers to the Pennsylvania quitline for any of the six media campaigns.

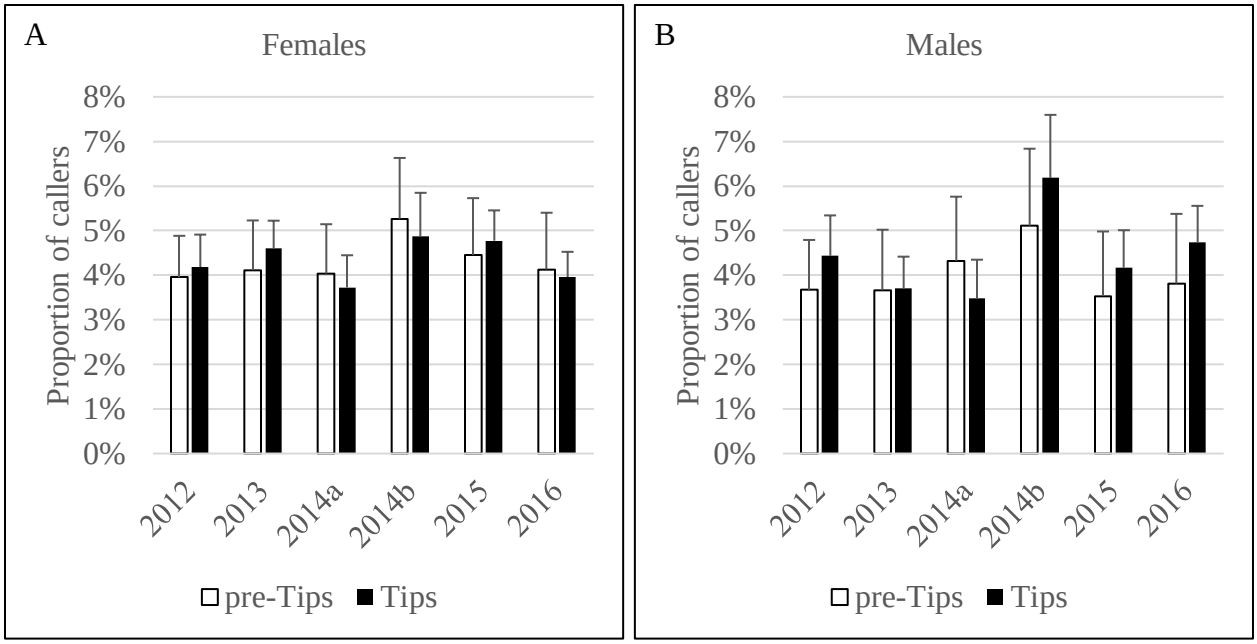

Figure 4.1. Change in proportion of LGBT callers to the quitline during Tips campaigns.

Callers who identify as LGBT during the 8-week period preceding each Tips campaign were compared to the proportion of callers during successive Tips campaigns from 2012 – 2016, and were stratified by gender. There were two campaigns in 2014 (a and b). The upper limit of the 95% confidence intervals surrounding the proportional estimates are shown. The *z*-scores (*p*-values) comparing the pre-campaign proportion of LGBT callers to the campaign proportions for females are presented in order: 0.378 (.706), 0.738 (.461), -0.470 (.638), -0.462 (.644), 0.424 (.672), -0.248 (.804); and for males, in order: 1.012 (.312), 0.051 (.959), -1.015 (.310), 0.918 (.359), 0.711 (.477), 0.956 (.339).

4.2 QUITLINE ENGAGEMENT: AIM 2

4.2.1 Proportionality of Quitline Callers

During the 2014-2016 years of intakes, corresponding with the years that the Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS) collected sexual orientation identity, 39,842 patients called the Pennsylvania quitline and completed an intake, that is, they responded to the questions about tobacco use and demographics in the Minimal Data Set (MDS). Overall, 4.4% of female callers identified as LGBT. The proportion of Pennsylvania females who reported current tobacco use in the BRFSS from 2014-2016 was 5.6%, a non-significant difference, $z = 1.17$, $p = .242$, compared to the proportion of female quitline callers. The proportion of Pennsylvania males who reported current tobacco use in the BRFSS from 2014-2016 was 4.3%, similarly a non-significant difference, $z = .26$, $p = .793$, compared to the 4.5% of male quitline callers who identified as LGBT.

4.2.2 Treatment Engagement in Females

For female quitline callers ($N = 24,419$) completing intakes in years 2012-2014, group imbalance between LGBT quitline callers ($n = 1,094$, 4.5%) compared to cisgender heterosexual callers ($n = 23,325$, 95.5%) were noted in demographics (age, race, ethnicity, insurance type, employment, and marital status), household characteristics (geographic region of Pennsylvania, and living with a tobacco user), tobacco use characteristics (age of cigarette initiation, menthol use, duration of smoking, motivation to stay quit, past year quit attempts, and perception of cessation difficulty), and health status indicators (smoking related disease, mental health condition, and

emotional health challenges). LGBT females, compared to heterosexual cisgender callers, completed on average 0.1 fewer calls, t (24,417) = 1.98, p = .048, 2.8% fewer completed at least three counseling calls, $\chi^2(1) = 5.13$, p = .023, and 2.6% fewer engaged in guideline-congruent tobacco treatment with counseling and medications, $\chi^2(1) = 4.55$, p = .033. These and additional characteristics are displayed in Table 4.7.

The propensity score matching (PSM) model achieved balance with all variables. The logistic regression model component of the PSM predicting treatment assignment was conducted separately to explore model fit and specification. For the logistic model predicting LGBT identity (treatment) among females, the model specification link test had a non-significant square of the predicted value, demonstrating that the treatment model was appropriately specified as a logistic model. The Hosmer-Lemeshow test demonstrated good model fit, $\chi^2(8) = 6.04$, p = .643. Observations that graphically appeared to be outliers did not change the model estimates in sensitivity tests and were retained in the final model. Based on the appropriateness of the logistic model, a control group was constructed using the matches identified using PSM.

The average treatment effect on the treated (ATET) examining engagement in tobacco treatment was estimated for LGBT female callers (Table 4.8). Compared to matched controls, LGBT callers engaged in approximately 0.1 more treatment calls, however the effect was not significantly different, z = 1.80, p = .073. Similarly, there were no significant treatment effects for LGBT females on receiving NRT, z = -0.41, p = .682, engaging in evidence-based counseling, z = 0.56, p = .578, or in guideline-based care, z = 1.0, p = .319.

4.2.3 Treatment Engagement in Males

Among male quitline callers (N = 14,791), group imbalances between LGBT (n = 671; 4.5%) and cisgender heterosexual (n = 14,120; 95.5%) callers were noted in demographics (age, race, education level, and marital status), household characteristics (geographic region of Pennsylvania), tobacco use characteristics (menthol use, duration of tobacco use, motivation to stay quit, and past year quit attempts), and health status indicators (smoking related disease, mental health condition, and emotional health challenges). These and additional characteristics are displayed in Table 4.7. LGBT males, compared to heterosexual cisgender males, had no significant bivariate differences in tobacco treatment engagement outcomes.

As with the female PSM model, the logistic regression component predicting treatment assignment was conducted separately to examine model fit and specification. The link test demonstrated that the model was appropriately specified as a logistic model, and the Hosmer-Lemeshow test demonstrated good model fit, $\chi^2(8) = 13.57$, $p = .094$. Observations that appeared graphically to be outliers did not change the model estimates in sensitivity tests and were retained in the final model. The control group was thus constructed using the matches identified using PSM.

The treatment effects for engaging in tobacco treatment for LGBT callers was not different in terms of engaging in treatment calls (Table 4.8), $z = -0.04$, $p = .965$, or for receipt of NRT, $z = 0.88$, $p = .377$. LGBT males were less engaged (-1.7%) in the minimum of three calls for evidence-based counseling, but the difference was not significant, $z = -0.76$, $p = .444$. Likewise, LGBT males were less engaged in guideline-based treatment with counseling and

Table 4.7

Characteristics of Quitline Callers by Sexual Orientation and Gender Identity

Variables	Females					Males				
	Heterosexual		LGBT			Heterosexual		LGBT		
	n	%	n	%	*p*	n	%	n	%	*p*
N	23,325	95.5	1,094	4.5		14,120	95.5	671	4.5	
Demographics										
Age, mean (SD)	47	13.2	37	12.8	<.001	45	13.3	41	13.9	<.001
Race					<.001					.001
White	15,114	65.6	618	57.0		9,617	68.8	469	70.3	
Black	6,917	30.0	383	35.3		3,617	25.9	143	21.4	
All other	1,003	4.4	83	7.7		737	5.3	55	8.3	
Ethnicity, Hispanic	1,100	4.7	96	8.8	<.001	905	6.4	47	7.0	.541
Education					.300					<.001
Less than high school	3,584	15.4	165	15.1		2,463	17.5	95	14.2	
High school/GED	9,422	40.5	415	38.0		6,516	46.3	220	32.8	
Some college	6,431	27.6	326	29.9		3,226	22.9	206	30.8	
College degree or higher	3,840	16.5	186	17.0		1,882	13.4	149	22.2	
Insurance					<.001					.266
Medicaid	2,784	12.0	150	13.8		1,168	8.4	67	10.0	

Table 4.7 (continued)

Medicare	3,339	14.4	125	11.5		2,026	14.5	103	15.4	
Private	3,731	16.1	146	13.5		2,137	15.3	89	13.3	
Other	7,356	31.8	335	30.9		3,831	27.4	192	28.7	
Uninsured	5,937	25.7	329	30.3		4,811	34.3	217	32.5	
Employment					<.001					.712
Employed/Student	9,595	41.6	483	44.2		6,501	46.5	311	46.4	
Unemployed	4,085	17.7	250	22.9		2,773	19.9	141	21.0	
Disabled/Not looking for work	9,414	40.8	359	32.9		46,935	33.6	218	32.5	
Marital status, Single	15,851	68.4	871	79.8	<.001	8,731	62.2	565	84.2	<.001
Household Characteristics										
Region					.010					.001
Allegheny	1,911	8.2	78	7.1		1,024	7.3	61	9.1	
North Central	1,187	5.1	54	4.9		754	5.3	31	4.6	
Northeast	2,879	12.3	121	11.1		1,891	13.4	55	8.2	
Northwest	1,130	4.8	56	5.1		621	4.4	40	6.0	
Philadelphia	8,350	35.8	425	38.9		5,092	36.1	272	40.5	
South Central	2,080	8.9	105	9.6		1,230	8.7	61	9.1	
Southeast	3,869	16.6	195	17.8		2,501	17.7	111	16.5	
Southwest	1,919	8.1	59	5.4		1,007	7.1	40	6.0	
Live with tobacco user	10,287	44.1	551	50.4	<.001	6,105	43.2	303	45.2	.327

Table 4.7 (continued)

Tobacco Characteristics										
Heaviness of Smoking Index, mean (SD)	3.2	1.5	3.2	1.5	.560	3.5	1.5	3.5	1.4	.842
Age of cigarette initiation, mean (SD)	17.1	5.6	16.2	5.1	<.001	16.4	5.1	16.7	5.2	.119
Quit attempts					.370					.894
None	2,093	9.0	115	10.5		1,458	10.3	69	10.3	
1 to 2	8,466	36.3	395	36.1		5,017	35.5	236	35.2	
3 to 4	6,105	26.2	281	25.7		3,170	22.5	159	23.7	
5 or more	6,661	28.6	303	27.7		4,475	31.7	207	30.9	
Smoke menthol	13,891	59.8	778	71.4	<.001	7,653	54.4	394	59.3	.014
Duration of use, n %)					<.001					<.001
0-5 years	918	3.9	113	10.3		584	4.2	64	9.6	
6-9 years	1,159	5.0	155	14.2		8,231	5.9	76	11.3	
10-19 years	4,190	18.0	305	27.9		2,667	18.9	138	20.6	
20-29 years	4,680	20.1	200	18.3		3,019	21.4	137	20.5	
30+ years	12,324	53.0	320	29.3		6,982	49.6	255	38.1	
Quit for good					<.001					.016
Strongly Disagree	72	0.3	2	0.2		49	0.4	5	0.8	
Disagree	120	0.5	8	0.7		123	0.9	6	0.9	
Neither	1,211	5.2	87	8.0		820	5.8	53	7.9	
Agree	7,501	32.2	395	36.1		4,860	34.4	250	37.3	

Table 4.7 (continued)

Strongly Agree	14,421	61.8	602	55.0		8,268	58.6	357	53.2	
Past year quit attempt lasting 24 hours	10,804	46.3	567	51.8	<.001	6,502	46.1	355	52.9	<.001
Difficult to not use	9,839	42.5	581	53.6	<.001	6,533	46.6	330	49.6	.126
Health Status										
Smoking related disease	11,122	47.9	400	36.8	<.001	6,127	43.6	257	38.4	.008
Mental Health Condition	10,844	46.5	664	60.7	<.001	5,089	36.0	350	52.2	<.001
Emotional Challenges	11,145	47.8	631	57.7	<.001	5,418	38.4	312	46.5	<.001
Treatment Characteristics										
Calls completed, mean (SD)	1.7	1.4	1.6	1.3	.048	1.7	1.4	1.7	1.3	.878
Received NRT (excl pregnant)	15,197	66.4	684	63.9	.094	9,075	64.3	436	65.0	.709
EBP Counseling (3+ calls)	4,683	20.1	189	17.3	.023	2,888	20.5	121	18.1	.128
Guideline-based treatment	4,283	18.4	173	15.8	.033	2,602	18.4	105	15.7	.069

Notes: Sample is callers who completed an intake with the Pennsylvania quitline from 2012 – 2014. Callers provide demographic information, tobacco use and motivational indicators, and health status indicators to a quit coach. Treatment characteristics are documented by quit coaches to reflect treatment received by callers. NRT = nicotine replacement therapy, EBP = evidence-based practice.

[a] Female callers who report pregnancy require additional clearance by a physician to receive NRT. For female callers, pregnant callers are excluded. Pregnant callers who do not receive NRT but received 3+ treatment calls were considered to have received guideline-based care.

medications (-2.2%), but the difference was not significant, $z = -1.05$, $p = .292$, compared to heterosexual cisgender controls.

4.3 QUITLINE CESSATION OUTCOMES: AIM 3

The completed follow up rate for callers who completed intakes from 2012-2014 was 16.0% for females, and 15.8% for males. The proportion of females completed the follow up interview and who identified as LGBT was significantly lower, $z = -2.79$, $p = .005$, than among females who called quitline to initiate treatment. The proportion of males completed the follow up interview and who identified as LGBT was not significantly different, $z = -0.18$, $p = .855$, than among males who initially called the quitline.

4.3.1 Cessation Outcomes in Females

A total of 3,909 (3.6% identified as LGBT) females completed the seven-month quitline follow up interview and provided a tobacco use status. Significant ($p < .05$) bivariate between group differences were identified in demographics (age, ethnicity, marital status), household characteristics (living with a tobacco user), tobacco use characteristics (age of cigarette initiation, duration of tobacco use, and perception of difficulty to not use), health status indicators (mental health conditions), and engaging in guideline-based treatment with three or more counseling calls and medications. Self-reported 30-day cessation was not significant different between the two groups (LGBT: 25.2%, Heterosexual: 31.7%), $\chi^2(1) = 2.66$, $p = .103$. Additional characteristics are displayed in Table 4.9.

Table 4.8

Treatment Effects for LGBT Quitline Callers Based on Matched Controls

Outcome	Female				Male			
	ATET	95% CI	z	p	ATET	95% CI	z	p
Calls completed (number)	0.101	[-0.009, 0.212]	1.80	0.073	-0.003	[-0.144, 0.138]	-0.04	0.965
Received NRT	-0.009	[-0.051, 0.033]	-0.41	0.682	0.024	[-0.029, 0.076]	0.88	0.377
Evidence-based counseling	0.010	[-0.024, 0.043]	0.56	0.578	-0.017	[-0.061, 0.027]	-0.76	0.444
Guideline-based treatment	0.016	[-0.016, 0.048]	1.00	0.319	-0.022	[-0.064, 0.019]	-1.05	0.292
30-day cessation outcomes	-0.104	[-0.220, 0.013]	-1.75	0.081	0.011	[-0.117, 0.138]	0.16	0.870

Notes: ATET = average treatment effect on the treated. CI = confidence interval. NRT = nicotine replacement therapy.

Table 4.9

Characteristics of Callers with Completed Follow Up Interviews by Sexual Orientation and Gender Identity

Variables	Females					Males				
	Heterosexual		LGBT			Heterosexual		LGBT		
	n	%	n	%	*p*	n	%	n	%	*p*
N (%)	3,770	96.4	139	3.6	0.005	2,229	95.5	104	4.5	0.855
Demographics										
Age, mean (SD)	50.8	12.1	41.4	13.8	<.001	49.5	13.0	44	13.9	<.001
Race					0.093					0.188
White	2,455	65.9	80	58.0		1,586	72.0	83	79.8	
Black	1,102	29.6	48	34.8		505	22.9	16	15.4	
All other	166	4.5	10	7.3		111	5.0	5	4.8	
Ethnicity, Hispanic	117	3.1	10	7.3	0.007	103	4.6	5	4.8	0.930
Education					0.175					<.001
Less than high school	558	14.9	17	12.2		386	17.3	13	12.5	
High school/GED	1,491	39.7	46	33.1		934	41.9	26	25.0	
Some college	1,046	27.8	49	35.3		584	26.2	39	37.5	
College degree or higher	663	17.6	27	19.4		323	14.5	26	25.0	
Insurance					0.681					0.632
Medicaid	458	12.2	16	11.6		202	9.1	10	9.7	
Medicare	719	19.2	22	15.9		450	20.3	19	18.5	

Table 4.9 (continued)

Private	632	16.9	20	14.5		354	16.0	14	13.6	
Other	1,104	29.5	43	31.2		622	28.1	36	35.0	
Uninsured	830	22.2	37	26.8		586	26.5	24	23.3	
Employment					0.984					0.860
Employed/Student	1,360	36.5	51	36.7		913	41.3	45	43.3	
Unemployed	519	13.9	20	14.4		324	14.7	16	15.4	
Disabled/Not looking for work	1,847	49.6	68	48.9		975	44.1	43	41.4	
Marital status, Single	2,558	68.3	116	83.5	<.001	1,305	58.9	93	89.4	<.001
Household Characteristics										
Region					0.591					0.925
Allegheny	354	9.4	10	7.2		194	8.7	8	7.7	
North Central	215	5.7	6	4.3		134	6.0	7	6.7	
Northeast	516	13.7	22	15.8		308	13.8	11	10.6	
Northwest	190	5.0	10	7.2		108	4.9	4	3.9	
Philadelphia	1,138	30.2	45	32.4		627	28.1	36	34.6	
South Central	370	9.8	13	9.4		230	10.3	11	10.6	
Southeast	649	17.2	26	18.7		456	20.5	20	19.2	
Southwest	338	9.0	7	5.0		172	7.7	7	6.7	
Live with tobacco user	1,520	40.3	70	50.4	0.018	884	39.7	43	41.4	0.731
Tobacco Use Characteristics										
Heaviness of Smoking Index, mean (SD)	3.2	1.4	3.4	1.5	0.081	3.4	1.5	3.5	1.3	0.238

Table 4.9 (continued)

Age of cigarette initiation, mean (SD)	17.4	5.9	15.8	4.4	<.001	16.5	5.2	16.8	4.9	0.524
Quit attempts					0.797					0.929
None	249	6.6	7	5.0		163	7.3	8	7.7	
1 to 2	1,298	34.4	45	32.4		758	34.0	35	33.7	
3 to 4	1,021	27.1	41	29.5		545	24.5	28	26.9	
5 or more	1,202	31.9	46	33.1		763	34.2	33	31.7	
Smoke menthol	2,110	56.1	88	63.3	0.092	1,063	47.8	54	52.4	0.358
Duration of use, n %)					<.001					0.001
0-5 years	100	2.7	13	9.4		61	2.7	9	8.7	
6-9 years	109	2.9	12	8.6		89	4.0	9	8.7	
10-19 years	481	12.8	28	20.1		299	13.4	17	16.4	
20-29 years	622	16.5	27	19.4		426	19.1	17	16.4	
30+ years	2,449	65.1	59	42.5		1,351	60.7	52	50.0	
Quit for good					0.676					0.189
Strongly Disagree	13	0.3	0	0.0		8	0.4	1	1.0	
Disagree	25	0.7	1	0.7		18	0.8	2	1.9	
Neither	201	5.3	9	6.5		124	5.6	9	8.7	
Agree	1,177	31.2	49	35.3		763	34.2	34	32.7	
Strongly Agree	2,354	62.4	80	57.6		1,316	59.0	58	55.8	
Past year quit attempt lasting 24 hours	1,856	49.2	79	56.8	0.078	1,094	49.1	60	57.7	0.086
Difficult to not use	1,482	39.6	71	51.1	0.007	938	42.4	46	44.7	0.643

Table 4.9 (continued)

Health Status										
Smoking related disease	2,113	56.1	71	51.1	0.238	1,129	50.7	48	46.2	0.360
Mental Health Condition	1,842	48.9	88	63.3	0.001	835	37.5	57	54.8	<.001
Emotional Challenges	1,835	48.7	79	56.8	0.059	879	39.4	48	46.2	0.171
Quitline Treatment Outcomes										
Calls completed, mean (SD)	2.2	1.6	2.5	1.8	0.083	2.3	1.7	2.4	1.6	0.876
Received NRT (excl pregnant)	2,860	76.6	109	80.2	0.333	1,705	76.5	78	75.0	0.726
EBP Counseling (3+ calls)	1,267	33.6	57	41.0	0.070	794	35.6	40	38.5	0.555
Guideline-based treatment	1,142	30.3	56	40.3	0.012	706	31.7	33	31.7	0.990
Self-reported 30-day abstinence	1,196	31.7	35	25.2	0.103	776	34.8	33	31.7	0.518

Notes: Sample is callers with intakes from 2012 – 2014, who completed a follow up interview with the Pennsylvania quitline. Callers provide demographic information, tobacco use and motivational indicators, and health status indicators to a quit coach. Treatment characteristics are documented by quit coaches to reflect treatment received by callers. NRT = nicotine replacement therapy, EBP = evidence-based practice.

[a] Female callers who report pregnancy require additional clearance by a physician to receive NRT. For female callers, pregnant callers are excluded. Pregnant callers who do not receive NRT but received 3+ treatment calls were considered to have received guideline-based care.

The initial PSM model was fit with the significant ($p < .05$) bivariate differences, however the logistic model demonstrated poor model fit in the Hosmer-Lemeshow test, and with very large standardized residuals. To correct for the poor model fit, the logistic model was refit with additional bivariate differences, $p < .15$, using a model building process (Hosmer, Lemeshow & Sturdivant, 2013). Variables added to the matching model included race, Heaviness of Smoking Index, menthol tobacco smoking, previous quit attempts, and emotional health challenges. The final logistic regression component predicting treatment assignment then demonstrated appropriate model specification, and the Hosmer-Lemeshow test demonstrated good model fit, $\chi^2(8) = 5.49$, $p = .704$. Participants that appeared graphically to be outliers did not change the model estimates during sensitivity tests and were thus retained in the final model. Comparing LGBT females who completed the follow up interview to the matched controls, there was a trend towards lower cessation (-10.4%), but the difference was not statistically significant, $z = -1.75$, $p = .081$ (Table 4.8).

4.3.2 Cessation Outcomes in Males

There were 2,333 males who completed follow up interviews (4.5% LGBT) and provided a tobacco use status at seven months after the initial intervention. Bivariate differences between LGBT and heterosexual cisgender males were noted in demographics (age, education, and marital status), tobacco use characteristics (duration of tobacco use), and health status indicators (mental health conditions). Self-reported 30-day cessation was not significantly different between the two groups (LGBT: 31.7%, heterosexual: 34.8%), $\chi^2(1) = 0.268$, $p = .518$. Additional characteristics are displayed in Table 4.9.

The PSM model was initially fit with the significant bivariate differences, and then adjusted by including bivariate differences, $p < .15$, in a model building process (Hosmer, Lemeshow & Sturdivant, 2013) to achieve covariates balance between the two groups. The final model additionally included past year quit attempts, bivariate $p = .086$. The logistic regression component of the PSM model predicting treatment assignment was conducted separately, demonstrating good model specification, and the Hosmer-Lemeshow test demonstrated good model fit, $\chi^2(8) = 9.06$, $p = .337$. Sensitivity tests performed without observations that graphically appeared to be outliers did not change the model estimates, and all observations were retained for the final model. Comparing LGBT males who completed the follow up interview to the matched controls, cessation was more frequent (1.1%), but the difference was not statistically significant, $z = 0.16$, $p = .87$ (Table 4.9).

5.0 DISCUSSION

There are several important findings regarding LGBT tobacco cessation interventions arising from the research conducted in this study. First, LGBT individuals in health care settings, whether tailored or non-tailored for LGBT care, were open to discussing tobacco use, and a substantial portion were willing to engage in treatment when it was offered. Nearly one-third of LGBT inpatients accepted the offer and were referred to the quitline by a Tobacco Treatment Service (TTS) counselor; a rate higher, though not statistically significant, compared to heterosexual cisgender-identified patients. Likewise, 40% of patients in an LGBT-tailored medical clinic who reported current tobacco use were willing to be referred by their provider to the quitline during their current appointment. Second, the proportion of quitline callers who identified as LGBT was not statistically different from the proportion of Pennsylvania adults who report current tobacco use at the state level, suggesting that LGBT people have equitable quitline access. Importantly, this proportion remained consistent during multiple waves of mass media campaigns promoting individuals who use tobacco to reach out for support. Finally, LGBT quitline callers did not differ significantly from similar heterosexual cisgender quitline callers in engaging in several indicators of quitline treatment, nor in rates of cessation seven-months after completing the initial intake. Each of these findings, and the implications for tobacco control and social work practice is discussed in more detail below.

5.1 QUITLINE ACCESS: AIM 1

5.1.1 Hospital-Based Referrals

This study represents the first report that routinely assessed sexual orientation and gender identity as a component of tobacco treatment with hospitalized patients. As such, most importantly these findings demonstrate the feasibility of integrating LGBT-identity into tobacco treatment in healthcare settings that are not specifically tailored for LGBT populations. The proportion of LGBT patients who accepted a referral from a TTS counselor, and had their contact information sent to the quitline for proactive telephone counseling, was higher than for non-LGBT patients (32.5% vs. 23.0%). The rate for LGBT patients was similar to the previously reported rate of 36% for accepting an electronic quitline referral in hospitalized patients who were not seeking treatment for tobacco use (Tindle et al., 2016). These results suggest that for hospitalized patients approached for treatment, LGBT individuals are at minimum as likely as non-LGBT individuals to accept a post-discharge tobacco cessation intervention.

The bivariate non-significant difference in the quitline referral rate for LGBT compared to non-LGBT patients is likely an artifact of the small sample size for LGBT patients compared to non-LGBT patients. A power analysis demonstrated that to achieve 80% power, a statistically significant result of this magnitude in the same patient population would require a minimum sample of n = 154 LGBT patients with the same LGBT sample proportion. In the adjusted logistic model, LGBT-identity was nearly significant, p = .067, with increased odds of 1.90 for accepting a quitline referral, after adjusting for age, a length of admission greater than the median of four days, and daily rather than non-daily tobacco smoking. In the adjusted model,

only increased age and daily tobacco smoking were significantly associated with accepting the quitline referral.

The number of LGBT-identified patients (2.4%) by the TTS is likely representative of the population of LGBT inpatient tobacco users. This proportion is lower compared to nationally representative community health surveys, such as the National Health Interview Survey that estimates about 3.4% of non-institutionalized U.S. adults identify as non-heterosexual (Dahlhamer, Galinsky, Joestl, & Ward, 2014). The lower proportion may result from the difference in average age that, in this sample, was greater than 10 years older for heterosexual cisgender patients than for LGBT patients. LGBT populations generally have a younger average age (Lunn et al., 2017), reflecting the increasing tolerance and acceptance our current society has for differences in identity of sexual orientation and gender, and the different social consequences individuals today face in developing an LGBT identity. Younger patients are also less likely to be hospitalized (National Center for Health Statistics, 2017), and the only statistically significant difference in demographics, hospitalization, tobacco use, and tobacco treatment characteristics between LGBT and non-LGBT patients was age.

The volume of patients who received a counseling intervention but who were not asked their sexual orientation and gender identity was substantial (26%). Notably, more men than women, and fewer Whites than other racial identities were not asked, possibly indicating groups that are more difficult to approach with a sensitive question in an often non-private inpatient environment. In these settings, patients may prefer to provide their sexual orientation and gender identity using paper or electronic non-verbal collection methods (German et al., 2016). Patients who were not asked also tended to have longer hospital admissions, and fewer were discharged to home, suggesting that for some patients, medical severity may have also been a factor in being

unable to address differences in sexual orientation and gender identity during tobacco treatment counseling with inpatients.

The process of providing culturally responsive training on the prevalence and specific risks driving the tobacco use disparity for LGBT people, coupled with training on assessing sexual orientation and gender identity with all patients illustrates a replicable process in other health and social care environments (Callahan et al., 2015). Training and then delivering culturally responsive care produces a reduced stigma care environment, and facilitates affirming and supportive relationships with providers that can diminish psychological distress and cognitive rumination about a stigmatized identity. This training process with a dedicated team of inpatient TTS clinical providers further facilitated an evaluation of care that would not otherwise have been possible. As hospitals, health systems, and regulators increasingly recognize the importance of delivering culturally responsive care to LGBT individuals (Callahan et al., 2015), improvements in the documentation of an LGBT identity in electronic health records will also improve the ability for researchers and evaluators to ascertain the differential impact of care systems for this socially vulnerable population (Cahill, Baker, Deutsch, Keatley, & Makadon, 2016). In particular, health systems with a quitline referral process can provide valuable data on access to cessation resources in order to further reduce tobacco use for LGBT populations.

5.1.2 LGBT-Tailored Medical Clinic

Overall, 40.6% of patients attending the LGBT-tailored primary care clinic and who were eligible for a tobacco treatment intervention, as recommended by the clinical tobacco treatment guidelines based on their tobacco use status, were amenable to a referral for telephone-based cessation counseling. The rate of acceptance was higher than the acceptance rate for both LGBT

and non-LGBT patients receiving a brief intervention by a TTS counselor in the inpatient sample. In published reports of quitline referral systems, faxed and electronic referral rates in outpatient settings ranged from 14%-30% (Adsit et al., 2014; Borland et al., 2008) and are comparable to 36% of patients for the electronic referral system in the inpatient setting (Tindle et al., 2016). In another study, 54.8% of primary care patients accepted an offer to hear more about tobacco treatment options, with 63.5% of those who accepted enrolling in treatment (Piper et al., 2013). Using this ratio as a benchmark, approximately 25% of patients attending the clinic would have enrolled in quitline treatment.

Individuals who reported current tobacco use more frequently had lower levels of education, lower income, and more public health insurance. These characteristics represent populations with a lower overall socioeconomic status, and are similarly characteristics of current tobacco use in the general U.S. adult population (Jamal et al., 2016). The sample of patient respondents in the LGBT-tailored primary care clinic was over-represented by gay and bisexual men, similar to the patient population attending this clinic, and by patients who reported current tobacco smoking (67%), suggesting that individuals with current tobacco use were more likely to complete the survey. Thus, the differences in characteristics by current tobacco use status may not be generalizable.

Sociodemographic characteristics did not differ, with the exception of sexual orientation, between patients reporting current tobacco use who would accept or refuse a quitline referral during their clinic visit. Accepting a quitline referral was independently associated with a heterosexual identity, compared to a gay or lesbian identity, as well as with acceptance of a recommendation for a texting or mobile app intervention, and higher likelihood of accepting a provider-initiated quitline referral in the multivariable logistic regression model.

The finding that a heterosexual identity was significantly associated with accepting a quitline referral in the LGBT-tailored clinic is intriguing and concerning. First, although the settings and interventions are vastly different, heterosexual-identified patients in the inpatient sample had lower rates of accepting a referral than LGBT-identified patients. Explanations for this difference might include sociodemographic differences such as age and sex differences between the two samples – younger age and proportionally more males in the outpatient sample. Secondly, heterosexual identity included individuals who identify as transgender/gender non-binary and also heterosexual, as well as cisgender heterosexual patients. The heterosexual-identified patients might prove to be more heterogeneous in a larger sample than can be evaluated in this study sample. These results are concerning for reducing tobacco disparities, as LGBT men have previously been shown to have lower awareness of the quitline (Fallin et al., 2016), LGBT adults who use tobacco report lower intent to use the quitline (Burns et al., 2011), and fewer use evidence-based cessation resources (Babb et al., 2017). Nevertheless, these findings may also increase understanding of differences in which LGBT patients will access quitlines in LGBT-tailored medical settings.

Many LGBT people report a preference for receiving care in medical settings tailored to LGBT health needs, particularly around sexual health (Koester et al., 2013) and tobacco treatment (Burns et al., 2011). LGBT health centers have additional benefits for patients who disclose an LGBT identity, including providing safe locations with reduced stigma for individuals to receive care that is also culturally responsive to their needs (Martos, Wilson, & Meyer, 2017). Importantly, recent research found that among LGBT health centers, exceedingly few provided care in line with the clinical treatment guidelines for tobacco treatment (Lee, DeMarco, Beymer, Shover, & Bolan, 2018). In this current study, while the primary care clinic

did not have a standardized process or protocol for addressing tobacco, the results suggest that patients who report using tobacco are open to non-tailored cessation intervention referrals initiated from LGBT health centers. Promoting quitlines as providing culturally responsive care for LGBT individuals from within an already reduce stigma environment lends additional credibility to the quitline, and could enhance access to tobacco treatment. While several examples of tobacco interventions have been exclusively delivered in LGBT healthcare and social service settings (Eliason et al., 2012; Matthews, Li, et al., 2013; Walls & Wisneski, 2011), efforts to reduce tobacco rates among LGBT populations through cessation can also be initiated through referrals to quitlines when patients visit LGBT health centers.

The significant association of willingness to be referred to a mobile app or texting resource suggests that in this sample planning to use a resource to stop smoking was an important component of initiating evidence-based treatment for tobacco. Using a treatment resource, such as medication to stop smoking (Fiore et al., 2008), or interactive internet (Taylor et al., 2017) and mobile-phone interventions (Whittaker, McRobbie, Bullen, Rodgers, & Gu, 2016) promotes successful cessation compared to unassisted cessation attempts. Similarly, increased likelihood of accepting a future referral was associated with accepting a referral during the visit, suggesting that individuals who would accept the referral in the current visit were already disposed towards receiving a tobacco intervention.

5.1.3 Tips From Former Smokers Campaign

The effect of public health campaigns at changing LGBT tobacco use is a very new area of study (Fallin, Neilands, et al., 2015), and no previous study has examined the effect of the *Tips From Former Smokers* campaign on promoting calls to the quitline from LGBT-identified people. This

study is the first to examine and report on the effect of *Tips* on the proportional changes in LGBT-identified callers to the quitline in the context of access to an evidence-based cessation resource. Importantly, the results from Pennsylvania suggest that LGBT-callers were as likely to be prompted to call the quitline via mass media campaigns as non-LGBT callers over the first six waves of the *Tips* campaign. Specifically, there were no significant differences in the proportions of either male or female callers who identified as LGBT during the campaigns compared to the eight weeks before each campaign. The *Tips* messages that link personal testimonials of receiving support through quitlines for a stigmatized tobacco user identity, may have broad resonance that suggests the quitline will be supportive for other forms of stigma, such as LGBT identity. The connection between support despite the stigma might lead to increased calls for a doubly stigmatized population.

While the *Tips* campaign has had demonstrable effect at increasing calls to the quitline (Davis et al., 2015), and increasing attempts to stop smoking (McAfee et al., 2013), few studies have examined the effect of the *Tips* campaign in subgroups, and have included finding positive impacts for pregnant women (England et al., 2017), and adolescents (Zhao & Cai, 2016). The results here add to these findings, and suggest that the results of the *Tips* media exposure equitably promoted LGBT calls to the tobacco quitline. Previous research has found that LGBT populations report exposure to tobacco control messages in mainstream media more frequently than in LGBT-themed media (Matthews, Balsam, et al., 2014). More recent research also highlights the changing face of media accessed by LGBT people, with higher rates of social media exposure (Seidenberg et al., 2017), combined with more exposure to tobacco-related content in social media (Emory, Buchting, Trinidad, Vera, & Emery, 2018). As the *Tips*

campaign evolves to include digital advertising (Davis et al., 2016), promoting LGBT-themed advertisements on social media may be beneficial in further promoting cessation behavior.

5.2 QUITLINE ENGAGEMENT: AIM 2

LGBT populations have a tobacco use prevalence disparity compared to the general population, as discussed throughout this dissertation. Reducing this disparity is vital to improving LGBT population health, while also reducing the overall rates of tobacco use. As a ubiquitous and accessible evidence-based cessation resource, telephone quitlines are an integral piece in reducing tobacco use through treatment. As the results discussed in this study have already shown, LGBT people are willing to access, and are accessing, the quitline through provider referrals, and on their own after prompting during mass media campaigns. Once a caller completes an intake with the quitline, successful treatment requires engagement in guideline-based care.

5.2.1 Proportionality of Quitline Callers

The first indicator of engagement in tobacco treatment with telephone quitlines at a population level is whether the population under study is engaged in care at a level equal to the proportion of the population eligible for care. Comparing data from the Pennsylvania Behavioral Risk Factor Surveillance System (BRFSS) and data from the Pennsylvania quitline, both from 2014-2016, there were no significant differences in the proportion of callers who identified as LGBT compared to the proportion of current tobacco users in Pennsylvania who identified as LGBT, in

either male or female subgroups. This finding is important in demonstrating that, similar to having access to the quitline, LGBT individuals are initiating quitline treatment at rates that are proportional to the prevalence of tobacco use among LGBT populations. The reach of the quitline appears equitable at a population level for LGBT and non-LGBT populations in Pennsylvania.

5.2.2 Treatment Engagement in Females

In the quitline caller population from 2012 – 2014, LGBT female callers engaged in fewer calls, fewer engaged in evidence-based counseling (EBC) with three or more calls, and fewer engaged in guideline-based treatment (GBT) of three or more calls along with cessation medication. After matching LGBT callers to similar non-LGBT callers, LGBT females engaged in more treatment calls on average, and the difference was near statistical significance. Likewise, this change from fewer to more treatment calls was observed with a 1% higher rate of engaging in EBC, and 1.6% higher for engaging in GBT, although these differences were not significant. Because differences in engagement were not observed in the matched patient group, the higher prevalence of tobacco use risk factors and barriers to cessation in overall comparisons are possibly the drivers of the bivariate differences in treatment engagement outcomes.

Female LGBT callers were significantly different from non-LGBT female callers in multiple domains, including demographics, household characteristics, tobacco use characteristics, and health status. Many of these differences have previously been reported in population surveys, including LGBT individuals being younger age, having higher rates of being uninsured in the pre-Affordable Care Act mandatory insurance era, higher rates of unemployment, being unmarried before the end of the state Defense of Marriage Act (Lunn et

al., 2017), smoking menthol tobacco (Fallin, Goodin, & King, 2015), and having a younger age of smoking initiation (Fallin, Goodin, Lee, & Bennett, 2015). Similarly, LGBT callers having higher rates of mental and emotional health challenges has also been reported in previous literature (Lukowski et al., 2016). While these factors suggest that LGBT female callers are similar to the overall population of LGBT females who use tobacco, importantly these characteristics are associated with increased tobacco use. The occurrence of these differences among quitline callers illustrate the increased risk for tobacco use among female LGBT populations that present additional barriers to tobacco control.

Findings that are unique in these current data include slightly lower levels of motivation in LGBT female callers that may correspond with lower use of cessation resources. Previous research found a lower, but non-significant, desire to stop among lesbian and bisexual compared to heterosexual women (Fallin, Goodin, Lee, et al., 2015). Additionally, the higher rates of perceived difficulty in stopping smoking may relate to a perception of normalized tobacco use in a community with higher tobacco prevalence, and may also represent a consequence of anti-LGBT stigma. LGBT females were also more likely to report a racial or ethnic minority identity, and racial and ethnic minority-identified adults, who face different and additive forms of stigma, have lower use of evidence-based treatment resources (Babb et al., 2017). The finding of differences in reported smoking-related disease prevalence is likely related to the younger age of the LGBT population, however this finding may represent an additional barrier, as diagnosis and perceived vulnerability to smoking-related illness motivates cessation (Borrelli, Hayes, Dunsiger, & Fava, 2010; Gregor & Borrelli, 2012).

5.2.3 Treatment Engagement in Males

Unlike with females, there were no statistically significant bivariate differences between LGBT and non-LGBT males in the treatment engagement outcomes. The average number of calls completed and the rate of NRT receipt was the same for both groups, but there was a trend towards LGBT males receiving less EBC, and GBT counseling with medication. After matching LGBT males with similar non-LGBT controls, these results remained the same with a trend for LGBT males to be less engaged in treatment, though none of the treatment effects were statistically significant. The consistency of these findings for the full sample and in the matched groups possibly reflects the overall baseline similarities in socioeconomic status with relatively small between group differences, compared to the differences in females, with LGBT males having higher rates of protective factors, such as education, along with higher rates of risk factors, such as mental health conditions. The null findings in treatment engagement further highlight the importance of using a gender-stratified analysis for LGBT tobacco use disparities (Cochran & Mays, 2017).

Male LGBT callers were also different from non-LGBT callers in demographics, household characteristics, tobacco use characteristics, and health status. As with LGBT females, many of the differences have been previously reported including LGBT males having younger age, higher levels of education, and being unmarried before the end of the state Defense of Marriage Act (Lunn et al., 2017). In the current sample, LGBT males were not different from heterosexual males with respect to insurance type, employment status, or age of cigarette smoking initiation. These characteristics correspond with the comparative demographic profiles for males by sexual orientation status (Fallin, Goodin, Lee, et al., 2015). Compared to cisgender heterosexual males, LGBT male callers had less smoking-related illness corresponding with the

younger average age, but higher rates of mental and emotional health challenges, the latter of which has been previously reported (Lukowski et al., 2016), with attendant risks and potential barriers to stopping tobacco use as previously discussed. LGBT males also reported a lower level of motivation to stop smoking, although the overall pattern of motivation was quite similar. As with females, gay and bisexual males reported a lower, but non-significant, desire to stop smoking in previous research (Fallin, Goodin, Lee, et al., 2015). Notably, there was no difference in rates of living with others who use tobacco, which has previously been linked to tobacco use for LGBT males (Gamarel et al., 2016).

5.3 QUITLINE CESSATION OUTCOMES: AIM 3

The previous aim demonstrated that LGBT people access the tobacco telephone quitline in proportion with the population size of adults who report current tobacco use in Pennsylvania, and that the rates of engaging in treatment with the quitline are not significantly different after matching LGBT and non-LGBT callers. Together, these findings provide an important baseline for examining the effect of quitline treatment on long-term cessation for LGBT people. Quitline long-term cessation outcomes are assessed at seven-months after the intake, and because follow up rates and processes are variable among states, quitlines generally report outcomes per protocol *as treated* (NAQC, 2009). Of note, quitline evaluations recommend including individuals who receive at least some telephone counseling (NAQC, 2015), and the data presented here include all callers who provided intake data but may not have engaged in counseling. Comparison of the rate of follow-up does not directly translate to other quitline reports and evaluations that employ different inclusion criteria and methods (NAQC, 2016).

As the first step in evaluating LGBT cessation after engaging in treatment with the quitline, examining differential drop out is important to contextualize any differences in outcomes. The proportion of female callers who completed a follow up interview and identified as LGBT was significantly lower by nearly 1% compared to the proportion who completed a quitline intake and identified as LGBT. LGBT females thus had a higher dropout rate than non-LGBT females in completing follow up. The proportion of male callers who completed and identified as LGBT was not different from the proportion that completed an intake and identified as LGBT. LGBT males therefore had the same dropout rate as non-LGBT males.

5.3.1 Cessation Outcomes in Females

Among the female callers who completed follow up, 6.5% fewer LGBT callers reported past 30 day abstinence after seven months, however the difference was not statistically significant, while a statistically significant 10% more LGBT females engaged in GBT with counseling and medications. Compared to the matched control group, including a match on receipt of GBT, LGBT females had a 10% lower rate of cessation, however this treatment effect was not statistically significant. LGBT females who completed follow up, compared to heterosexual cisgender females, were more likely to report a racial or ethnic minority identity, report being unmarried, and live with another person who used tobacco. LGBT females also reported a younger age of cigarette initiation, a higher perception of difficulty in stopping tobacco use, and higher rates of mental health conditions. As previously noted, these latter two differences might be surrogate markers for LGBT-related stigma that could influence cessation. While the cessation rates were not significantly different, the difference may still suggest that among

LGBT females, being more engaged in quitline treatment was not sufficient to counter the higher prevalence of LGBT and stigma-related risk factors in predicting long-term cessation.

These results also highlight the clinical importance of addressing the tobacco use disparity for LGBT women with lower cessation rates (Cochran & Mays, 2017). Based upon the trend towards lower cessation despite higher treatment engagement, there is potentially a concern for higher rates of relapse to tobacco use among LGBT females after quitline treatment. Most of the prior studies examining cessation with LGBT populations have been over-represented by males, with only one exception (Walls & Wisneski, 2011), and have reported cessation rates that were not different between LGB and non-LGBT participants (Covey et al., 2009; Grady et al., 2014), or rates similar to non-LGBT-tailored cessation groups (Eliason et al., 2012; Harding, Bensley, & Corrigan, 2004; Matthews, Li, et al., 2013). National tobacco use prevalence data shows that LGBT females have a substantial tobacco use disparity compared to cisgender heterosexual women, especially relative to the differences for males (Jamal et al., 2016). The results here suggest that additional research focusing on LGBT females is of pressing importance.

The higher rates of engagement in the follow up cohort, and lower rates of engagement in the engagement cohort, suggests that LGBT females who did not respond to the follow up call were likewise less engaged in quitline care. Research using nationally representative surveys similarly has identified that LGBT females report reduced engagement with healthcare services (Jackson, Agénor, Johnson, Austin, & Kawachi, 2016). These results further suggest that targeted efforts to sustain engagement and mitigate the effects of stigma among LGBT females is important, and that additional efforts to promote cessation are needed.

5.3.2 Cessation Outcomes in Males

Among males who complete follow up, compared to heterosexual cisgender males, LGBT males had no differences in engaging in quitline treatment, and slightly fewer reported cessation, but the difference was not statistically significant. After matching, LGBT males had a slightly higher rate of cessation after quitline treatment, but again the difference was not statistically significant. LGBT males were younger, had higher levels of education, and more reported being unmarried compared to cisgender heterosexual males. More LGBT males also reported having mental health conditions. For LGBT males, the combination of higher rates of factors that potentially promote cessation and of risk factors for tobacco use may be balanced, and thus generate cessation rates that are equitable. Anti-LGBT stigma could also be influenced by the intersection of gender (Crenshaw, 1991), such that the impact of stigma on tobacco cessation is different for LGBT males and females. These results correspond with the studies of LGBT treatment, that have most often included more men than women, that found no differences in cessation rates between LGBT and non-LGBT men (Covey et al., 2009; Grady et al., 2014), and no differences compared to the expected rates in non-LGBT-tailored cessation programs (Eliason et al., 2012; Harding et al., 2004; Matthews, Li, et al., 2013). Overall, delivering tobacco cessation interventions with LGBT men may result in outcomes that are equitable to cisgender heterosexual men.

5.4 RELATIONSHIP TO THEORY

Although experiences and perceptions of stigma and minority stress were not directly measured with participants in this study, LGBT people are significantly impacted by multiple forms of stigma and unique stress, as reviewed in Chapter 2. For many LGBT people, stigma forms the social context within which heightened risks for a tobacco use disparity persist. As such, it is important to contextualize the results of this study in the theoretical framework of stigma and minority stress. Examining access, engagement, and cessation outcomes by telephone quitlines within this context highlights the importance of assessing and addressing LGBT identity during treatment.

In the study with inpatients who reported tobacco use and received inpatient cessation counseling, men were less likely to be asked their sexual orientation and gender identity than were women, as were racial minorities compared to White-identified patients. In the context of minority stigma, provider implicit biases (Sabin, Riskind, & Nosek, 2015) may interfere with fully responding to sexual orientation and gender differences for some patients (Lambda Legal, 2010). Systems-level interventions that include documenting sexual orientation and gender identity for all patients at registration (Cahill et al., 2016) could alleviate provider discomfort, but could also alter the interaction with patients in ways that could preclude addressing the impact of an LGBT identity on the medical condition requiring treatment.

The most prominent way that assessing LGBT identity during tobacco treatment addresses stigma is by unmasking concealed LGBT-identity stigma within a therapeutic relationship. When a stigmatized identity is revealed, and affirmed by the provider, identity can be integrated into care resulting in better health outcomes (Donald & Ehrenfeld, 2015; Durso & Meyer, 2013). Tobacco providers can reduce perceived stigma by modeling welcoming and

affirming relationships and environments (Brooks et al., 2018). Particularly for an identity that is concealable, it is imperative that healthcare providers ask about LGBT identity in the practice setting, where other contextual cues such as clothing and cultural symbols, for example a rainbow to symbolize LGBT identity, may not be present. The results of the current study show that most patients in healthcare settings are open to being asked and are willing to answer, with very few refusals in primary care, inpatient, and telephonic health settings.

Providing care that responds to LGBT identity also explicitly displays to all patients, both LGBT and cisgender heterosexuals, that there is value in an LGBT identity and that identity is relevant to treating the whole person (Donald & Ehrenfeld, 2015). Demonstrating that the provider cares about the marginalized identity further humanizes the stigmatized identity, in direct opposition to enacted stigma that seeks to dehumanize the individual because of their identity (Goffman, 1963; Phelan et al., 2008). Equally important, assessing LGBT identity can relieve the pressure of concealment and the attendant process of thought intrusion, suppression, and rumination that occurs when individuals attempt to conceal a stigmatized identity (Pachankis, 2007; Smart & Wegner, 1999). Asking about, and integrating sexual orientation and gender identity into care can reduce the shame, fear of rejection, and psychological distress that accompanies stigma (Hatzenbuehler, 2009; Pachankis, 2007). Further, unmasking stigma and re-humanizing a stigmatized identity, promotes a therapeutic relationship with a higher potential for an LGBT patient to have positive self-evaluation, increased self-efficacy, and identity coherence and integration (Pachankis, 2007).

The importance of tobacco treatment providers asking LGBT identity is also realized in initiating a conversation about how LGBT individuals have increased risks for tobacco use, and that cessation resources, such as the quitline, are available to provide culturally responsive care.

In so doing, providers act to reverse stigma discrimination by explicitly conferring a resource that is available, accessible, and welcoming of the stigmatized identity (Link & Phelan, 2001). Quitlines, in responding to LGBT identity, are directly countering structural stigma by creating a resource that is explicitly welcoming to LGBT callers (Hatzenbuehler et al., 2013). In this study, in an LGBT-tailored medical clinic, an environment expected to have low LGBT structural stigma (Martos et al., 2017), the finding from the multivariable regression that straight-identified patients were more likely to accept a quitline referral may be a signal that LGBT-identified people are unaware of the fact that quitline coaches are trained to respond to LGBT needs (Lukowski et al., 2016), and may perceive that structural stigma exists in quitlines.

Internalized stigma is activated through interpersonal interactions that result in playing out negative stereotypes, increasing rejection sensitivity, and identity ambivalence (Link & Phelan, 2001; Major & O'Brien, 2005). A therapeutic relationship that is initiated in openness and affirmation of an LGBT identity provides an opportunity for the LGBT person to fulfill a new social role. Where a tobacco use disparity is hypothesized to result from LGBT stigma (Hatzenbuehler, Keyes, et al., 2014; Pachankis et al., 2014), positive social interactions that affirm and promote identity integration are important for tobacco cessation and reducing the LGBT population tobacco use disparity.

Minority stress theory suggests that tobacco use could also be a negative coping strategy for dealing with a hostile social environment (Hatzenbuehler, 2009; Meyer & Frost, 2013). Assisting individuals to stop smoking potentially removes a coping strategy that included formation of an alternative social identity – the ‘smoker’ – or a common identity (Stuber et al., 2008) within which to receive social support (Poland et al., 2006). In a demographic community with higher prevalence of tobacco use (Jamal et al., 2016), and social norms of tobacco use

(Hamilton & Mahalik, 2009), removing the 'smoker' identity through cessation changes a social role that the individual plays in their community, and potentially removes a source of support. High tobacco prevalence within LGBT social networks has previously been demonstrated to be associated with increased risk for tobacco use (Hatzenbuehler, McLaughlin, & Xuan, 2015). Lower rates of engagement and cessation among LGBT women might then also be related to the social networks and identities these women rely upon for support (Rosario et al., 2008). LGBT men may already have additional coping strategies available related to having higher socioeconomic status as indicated by higher levels of education (Cutler, Huang, & Lleras-Muney, 2015) compared to heterosexual cisgender men.

Stopping smoking does not only remove a negative stress-coping strategy, but could also assist individuals to experience mastery and build self-efficacy (DiClemente, 1981; Perkins, Parzynski, Mercincavage, Conklin, & Fonte, 2012; Warner et al., 2018). Higher levels of mastery in older LGBT men has previously demonstrated an effect on decreasing the impact of minority stress on mental health (Wight et al., 2012). Assisting LGBT individuals to stop smoking tobacco could thus be important for improving overall mental health through an increased sense of mastery. In addition, assessing LGBT identity and integrating identity into tobacco treatment could improve self-acceptance through disclosure of an LGBT identity, thereby increasing positive coping with minority stress (Meyer, 2003).

5.5 IMPLICATIONS FOR FUTURE RESEARCH

The results from this dissertation identify important areas for future research. Most importantly, and despite the null findings of statistically significant differences in quitline engagement and

cessation outcomes, this research should be replicated with data from other states, and with other quitline providers in order to fully understand the impact of quitlines on reducing LGBT tobacco use in the United States. Additional questions that can be investigated using these data include whether LGBT and non-LGBT between group differences in tobacco use are important predictors of cessation, and whether differences, such as mental and emotional health challenges, might be targets of additional intervention in LGBT tobacco treatment.

There was a signal in the data that LGBT females may have lower quitline treatment engagement indicators and lower cessation rates that should be further investigated. Most of the research on LGBT tobacco interventions with individuals has involved males, or has not disaggregated males from females in samples of LGBT people. Research with LGBT females is needed to better understand the risks and barriers to engagement in tobacco treatment with quitlines, and the trend towards lower cessation when matched on engagement level. Such research should include both qualitative and quantitative methods, as well as an intersectional analysis of gender, race, and sexual orientation. Potential methods for this research might include social network analysis, exploration of social norms about tobacco among LGBT females, and the impact of social support and stigma on tobacco use. LGBT females who use tobacco may have specific risks that remain unaddressed in the current methods of access, engagement, and treatment.

Similarly, LGBT people continue to have a tobacco use prevalence disparity. Reducing the disparity to meet the Healthy People 2020 (U.S. Department of Health and Human Services) goal of 12% tobacco prevalence requires high levels of support to better understand how to increase access to evidence-based treatment resources, including quitlines. LGBT people who use tobacco are younger on average, and have higher rates of alternative media use. The effect of

these new forms of media with targeted messaging to access treatment requires study, including whether these targeted and alternative media messages influence treatment engagement and cessation outcomes.

Finally, the research conducted for this dissertation draws on the social context of stigma and minority stress theories in examining quitlines. Future research should include measures of internalized and perceived stigma in multiple health settings to better understand how stigma influences access to the quitline. The majority of patients do not accept a quitline referral, and for LGBT people, any impact of perceived stigma should be elucidated in order to better understand how the pernicious nature of chronic stigma stress influences decisions to engage in tobacco treatment.

5.6 IMPLICATIONS FOR POLICY AND PRACTICE

The research presented in this dissertation has important implications for tobacco control policy, social welfare policy, and for social work practice. The implications for tobacco control policy are discussed using the applicable components of the World Health Organization's framework on tobacco control. In addition to the implications for social policy and social work practice that have already been discussed generally, specific implications for social work policy and practice are presented.

5.6.1 Tobacco Control Policy: LGBT MPOWER

Tobacco policy in the United States has evolved over time, culminating into control of a public health epidemic in the last decade. The legacy of this policy response changed the face of tobacco smoking from the general public increasingly towards marginalized groups of people. While the tobacco industry bears full responsibility for its efforts to subvert voluntary and governmental controls, the historical tepid government response has sustained a tobacco smoking epidemic for stigmatized groups of people. Alarmingly, these efforts to reduce tobacco smoking are in danger of being discontinued (Clark, Sparks, McDonald, & Dickerson, 2011) before the problem is fully addressed.

The problem of smoking disparities among LGBT people can be analyzed using the World Health Organization's MPOWER (2008) policy framework for tobacco control. This framework outlines a comprehensive approach to reducing exposure to the harms of tobacco that includes monitoring tobacco prevalence, protection from environmental tobacco smoke, offering support for cessation, warning about the dangers of tobacco smoking, enforcing advertising bans, and raising taxes on tobacco products. The results of this study have tobacco control policy implications that are especially relevant for three of these domains: monitoring the tobacco use epidemic, offering cessation assistance, and warning individuals about the dangers of smoking.

Monitoring tobacco smoking as the first strategy is now well underway and has documented the ongoing health disparity for LGBT people (Lee et al., 2009). As more surveys include sexual orientation questions and others begin to ask questions of gender identity, enhanced data quality will help guide understanding not only about the prevalence of smoking but also success of tobacco control policy for LGBT people. Recent research however, has highlighted that transgender individuals may also represent a smoking disparity group that is not

currently captured in national representative surveys that assess smoking status (Grant et al., 2010; Rath, Villanti, Rubenstein, & Vallone, 2013). The results of this current study highlight a strategy of asking LGBT identity in healthcare settings and surveys in order to document progress toward addressing the tobacco use disparity.

Offering support to assist LGBT people to stop smoking is understudied, particularly outside of urban centers with community organizations and LGBT health centers that may offer interventions tailored to the needs of the local community (Lee et al., 2014). Recent research also shows that within LGBT health centers, the delivery of tobacco interventions is highly variable, with very few centers delivering care according to clinical guidelines (Lee et al., 2018). Providers in both LGBT-tailored and mainstream health settings can offer cessation assistance resources, including medications and referrals for tobacco treatment counseling. Every state has a telephone quitline many with no eligibility restrictions, most provide specific information to LGBT callers (NAQC, 2011), and results from this current study suggest that LGBT people may call the quitlines in proportion to the population of current tobacco users who identify as LGBT. Previous research has identified a lack of knowledge about available cessation resources (Fallin et al., 2016) and low intent to engage in the services available (Levinson et al., 2012) among LGBT adults. In this context, this current study illustrates the feasibility of activating health systems to address the LGBT tobacco use disparity through referrals for treatment.

Similarly, warning LGBT individuals about the dangers of smoking has traditionally not been specific to the needs of the community. Heterosexist language, weak anti-tobacco, and messaging that overemphasizes disparities may have no effect, and may even alienate a vulnerable community from the needed public health warnings (Lee et al., 2017). Recent success in this area includes recognition by the Centers for Disease Control and Prevention in developing

specific material for the LGBT community in print and broadcast messages (Centers for Disease Control and Prevention, n.d.). Research findings demonstrate that LGBT people are more likely to view anti-tobacco messages in mainstream media (Matthews, Balsam, et al., 2014), compared to LGBT-tailored media, and results from the current study suggest that in Pennsylvania, both LGBT and non-LGBT adults appear to be similarly impacted, as measured by quitline intakes, during the mass media campaigns to warn about the dangers of tobacco.

5.6.2 Social Policy to Protect LGBT People

The modern history of LGBT rights in the United States has existed within a framework of religion, law, and medicine. A desire to discover the cause of homosexuality has been intricately tied to the concern that something must be done to correct a problem, whether through treatment or punishment (Terry, 1999). Homosexuality was different and undesirable, and therefore could be an object of stigma. Foucault (1978) suggested that the interest in homosexuality as a medical condition created a new LGBT identity that while problematic also provided a path towards normalization of sexual and gender difference. A new era of research has highlighted that the health and wellbeing of LGBT people should be understood not as a consequence of sexual behavior, but rather within the social context surrounding LGBT identity. *Being* LGBT was not intrinsically a social problem, rather, the problem is stigma, and removing the salience of LGBT difference includes framing LGBT identity as natural variation in sexuality and gender identity.

Within the stigma context, the LGBT rights movement has demonstrated how a stigmatized group can be protected by changing the laws and policies that allow stigma to be perpetuated. LGBT groups in the United States have found substantial success in fighting for equality in marriage rights nationally through legislation and lawsuits, and continue to strive for

equal rights protection in employment and housing that have no current nation-wide guarantee. While the tide of attitudes towards LGBT people has rapidly changed for the better (Becker, 2014), many young LGBT people continue to form their identities in the context of discrimination and prejudice directed towards sexual and gender minorities. As a result, their risks of poor health will remain elevated so long as policy is determined in the absence of knowledge and interventions to protect the rights and promote the well-being of LGBT people in law, policy, and practice (Ylioja & Craig, 2014). Continued efforts to improve the protection of rights for LGBT people is vital in removing the ability to stigmatize based on sexual orientation and gender identity, including through legislation of non-discrimination in housing, employment, and violence victimization.

5.6.3 Social Work Practice

The results presented in this dissertation can be integrated into social work practice in both healthcare and social service settings. Social work is predominantly a practice profession, with a strong presence in the field of addictions and mental health, and working with socially vulnerable groups that coincide with the demographics of smoking. Social workers are ideally situated to address the tobacco disparity for LGBT people, and should receive training to provide culturally responsive individual and group counseling to assist individuals stop smoking. Culturally responsive care requires humility from the practitioner, and a commitment to provide equitable care in partnership with the population served (Tervalon & Murray-Garcia, 1998). In particular, cultural humility is required both to understand the unique intersectional experiences of LGBT people (Crenshaw, 1991), and also to recognize the similarities of human experience.

Social work practitioners should obtain training to learn the best practices in assessing sexual orientation and gender identity with all clients. Facilitating identity disclosure in safe spaces is vital to fostering therapeutic relationships with LGBT clients that demonstrates value to a stigmatized identity. Practitioners should provide identity-affirming care with LGBT individuals (Hunter & Hickerson, 2003), that includes attention to equitable relationships with LGBT clients, addressing issues of social justice for a stigmatized identity, and a belief in the inherent dignity of each client.

Policy advocacy and community organizing is an area that social workers can impact the exposure of LGBT people to tobacco. Social workers can lobby legislators and policy bureaucrats to strengthen the clean indoor air laws that expose LGBT people to environmental toxins during socialization. Social workers can also engage in stakeholder and community organizing to support businesses where LGBT socialize to institute voluntary smoke-free measures, and mobilize the LGBT community to combat tobacco industry tactics. Social workers should advocate for inclusivity in public health messages that address the diversity of the tobacco use epidemic, and in particular address the cultural humility needed to effectively warn LGBT people about the dangers of smoking. Social workers can advocate for policies that are equitable, and ensure that services are available to help LGBT individuals stop smoking including access to the behavioral and pharmacotherapy interventions with proven efficacy. Finally, social work research can investigate and evaluate the impact of policy interventions on LGBT people.

5.7 LIMITATIONS

There are several limitations to the data presented and discussed in this dissertation. Most importantly, identifying LGBT people requires individuals to disclose a potentially stigmatized identity, and some patients may choose to not answer the question. Patients who continue to conceal their identity may have perceived stigma and be less likely to access or engage with tobacco treatment resources.

All of the data analyzed was drawn from convenience samples of individuals accessing healthcare systems including hospitals, an LGBT-tailored primary care clinic, and a telephone quitline. As a result, the data may not be generalizable outside of the locations in which they were collected. Additionally, data from the inpatient and telephone tobacco treatment settings were collected for clinical purposes, with the analyses conducted *post hoc,* and patients may have responded differently due to social desirability in clinical encounters than they might otherwise in an anonymous survey.

Patients counseled in the inpatient setting represent only a subset of patients who report current tobacco use, and they differ in demographics, health status, and hospital utilization from those who were not counseled (Ylioja et al., 2017). There were also identified differences in patients who were not asked their sexual orientation or gender identity, particularly among men and racial minorities, suggesting that selection bias may impact the results of this study. Additionally, the obtained referral rates here for LGBT patients may not be generalizable to other inpatient TTS that have not received training in the cultural relevance of LGBT identity to tobacco treatment.

Similarly, individuals who contacted the quitline represent a subset of current tobacco users in Pennsylvania, and there may be unmeasured bias among treatment seeking individuals

compared to the general population who report using tobacco. The quitline outcomes studied here were limited to one quitline provider and one state, and may not apply to other quitline providers or in other state populations. State tobacco control policy and social environment (Hatzenbuehler, Jun, et al., 2014; Hatzenbuehler, Keyes, et al., 2014) both impact LGBT tobacco use rates and a state-level analysis is needed to better understand the application of these findings in other settings. For both of these data sources, the conclusions necessarily apply only to similar samples of TTS-counseled inpatients or individuals who call the quitline for service in Pennsylvania, and population inferences cannot be made (Curran-Everett & Milgrom, 2013).

The survey data collected in the LGBT primary care clinic was a convenience sample and did not include a response rate and the effect of nonresponse bias is unknown. Because the demographics of the clinic population were not available, the representativeness of these data are uncertain. Caution in applying the survey results in other LGBT health centers where the patient population may be different is warranted, however this does not preclude the necessity of delivering care according to the tobacco treatment guidelines in LGBT health centers (Lee et al., 2018). In addition, willingness to accept a quitline referral was hypothetical and may not reflect the proportion of patients who would accept a referral during the clinical encounter.

Finally, propensity score matching (PSM) has additional limitations inherent in estimating causal outcomes using observational data for the engagement and cessation outcomes. While PSM balances observed covariates in the absence of randomization (Rosenbaum & Rubin, 1984), randomization also balances unobserved covariates. However, in large data sets PSM achieves close covariate balance to approximate randomization (Rubin, 1997). PSM also reduces the sample size of the control group, in this case removing the vast majority of callers from the outcome analyses. Alternative methods to control for between group differences in assessing

treatment effects while retaining the full sample include using weights based on propensity scores. The limitations of estimating causal effects in this latter method of propensity score matching still apply. Furthermore, PSM does not provide the relative importance of the between group differences, which may be applicable for intervention development. Hierarchical regression models could alternatively identify the salient factors to determining quitline engagement and cessation outcomes.

5.8 SUMMARY AND CONCLUSIONS

This dissertation research examines how LGBT people who use tobacco access and engage with the tobacco quitline, representing a first look at these outcomes. Previous research on quitlines for LGBT people is limited to a demographic profiles of LGBT people who intend to access, or have accessed quitlines. The findings in this current research are thus novel, and highlight important factors in promoting quitlines to LGBT populations for assistance with tobacco cessation. In addition, these results further illustrate the feasibility and appropriateness of provider-patient conversations that include an assessment of LGBT identity with all patients in multiple healthcare settings. After receiving training in LGBT cultural responsiveness, tobacco treatment providers can integrate LGBT identity into tobacco treatment in healthcare settings. LGBT people are open to discussing their tobacco use and are willing to receive referrals to treatment from their providers in both LGBT-tailored and non-tailored health settings. These findings reinforce the need for the clinical treatment guidelines for tobacco use to be followed, particularly for LGBT-identified patients, to reduce population-level tobacco disparities.

Overall, the results from this dissertation research suggest that the quitline is providing equitable care to LGBT people in Pennsylvania, in both engagement and cessation of smoking after treatment. LGBT males appear to have smaller differences in outcomes compared to their cisgender heterosexual counterparts, relative to LGBT women, although there were no statistically significant differences. These relatively larger differences in engagement and cessation outcomes for LGBT women is concerning because the tobacco use prevalence disparity between LGBT and non-LGBT women is also larger. Additional focus in tobacco control is indicated for LGBT people to increase their access to treatment, maintain their engagement in treatment, and to further supplement cessation attempts with evidence-based resources.

6.0 BIBLIOGRAPHY

Abadie, A., & Imbens, G. W. (2016). Matching on the estimated propensity score. *Econometrica, 84*(2), 781-807. doi:10.3982/ECTA11293

Adsit, R. T., Fox, B. M., Tsiolis, T., Ogland, C., Simerson, M., Vind, L. M., . . . Fiore, M. C. (2014). Using the electronic health record to connect primary care patients to evidence-based telephonic tobacco quitline services: a closed-loop demonstration project. *Translational Behavioral Medicine, 4*(3), 324-332. doi:10.1007/s13142-014-0259-y

American Lung Association. (n.d.). Freedom From Smoking. Retrieved October 29, 2014 from http://www.lung.org/stop-smoking/join-freedom-from-smoking/about-freedom-from-smoking.html.

Babb, S., Malarcher, A., Schauer, G., Asman, K., & Jamal, A. (2017). Quitting smoking among adults — United States, 2000–2015. *Morbidity and Mortality Weekly Report, 65*, 1457–1464. doi:10.15585/mmwr.mm6552a1

Bala, M. M., Strzeszynski, L., Topor-Madry, R., & Cahill, K. (2013). Mass media interventions for smoking cessation in adults. *Cochrane Database of Systematic Reviews,* (6). Retrieved from doi:10.1002/14651858.CD004704.pub3

Balsam, K. F., Beadnell, B., & Riggs, K. R. (2012). Understanding sexual orientation health disparities in smoking: a population-based analysis. *American Journal of Orthopsychiatry, 82*(4), 482-493. doi:10.1111/j.1939-0025.2012.01186.x

Baskerville, N. B., Dash, D., Shuh, A., Wong, K., Abramowicz, A., Yessis, J., & Kennedy, R. D. (2017). Tobacco use cessation interventions for lesbian, gay, bisexual, transgender and queer youth and young adults: A scoping review. *Preventive Medicine Reports, 6*, 53-62. doi:10.1016/j.pmedr.2017.02.004

Baskerville, N. B., Shuh, A., Wong-Francq, K., Dash, D., & Abramowicz, A. (2017). LGBTQ youth and young adult perspectives on a culturally tailored group smoking cessation program. *Nicotine & Tobacco Research, 19*(8), 960-967. doi:10.1093/ntr/ntx011

Baumeister, R. F., DeWall, C. N., Ciarocco, N. J., & Twenge, J. M. (2005). Social exclusion impairs self-regulation. *Journal of Personality and Social Psychology, 88*(4), 589-604. doi:10.1037/0022-3514.88.4.589

Becker, A. B. (2014). Employment discrimination, local school boards, and LGBT civil rights: Reviewing 25 years of public opinion data. *International Journal of Public Opinion Research 26*(3), 342-354. doi:10.1093/ijpor/edu003

Bell, K., Salmon, A., Bowers, M., Bell, J., & McCullough, L. (2010). Smoking, stigma and tobacco 'denormalization': Further reflections on the use of stigma as a public health tool. A commentary on Social Science & Medicine's Stigma, Prejudice, Discrimination and Health Special Issue (67: 3). *Social Science & Medicine, 70*(6), 795-799. doi:10.1016/j.socscimed.2009.09.060

Bendel, R. B., & Afifi, A. A. (1977). Comparison of stopping rules in forward "stepwise" regression. *Journal of the American Statistical Association, 72*(357), 46-53. doi:10.2307/2286904

Benowitz, N. L. (2009). Pharmacology of nicotine: Addiction, smoking-induced disease, and therapeutics. *Annual Review of Pharmacology and Toxicology, 49*(1), 57-71. doi:10.1146/annurev.pharmtox.48.113006.094742

Benowitz, N. L., Jacob Iii, P., Ahijevych, K., Jarvis, M. J., Hall, S., LeHouezec, J., . . . Velicer, W. (2002). Biochemical verification of tobacco use and cessation. *Nicotine and Tobacco Research, 4*(2), 149-159. doi:10.1080/14622200210123581

Blosnich, J. R., Farmer, G. W., Lee, J. G. L., Silenzio, V. M. B., & Bowen, D. J. (2014). Health inequalities among sexual minority adults: Evidence from ten U. S. states, 2010. *American Journal of Preventive Medicine, 46*(4), 337-349. doi:10.1016/j.amepre.2013.11.010

Blosnich, J. R., & Horn, K. (2011). Associations of discrimination and violence with smoking among emerging adults: differences by gender and sexual orientation. *Nicotine and Tobacco Research, 13*(12), 1284-1295. doi:10.1093/ntr/ntr183

Blosnich, J. R., Jarrett, T., & Horn, K. (2011). Racial and ethnic differences in current use of cigarettes, cigars, and hookahs among lesbian, gay, and bisexual young adults. *Nicotine and Tobacco Research, 13*(6), 487-491. doi:10.1093/ntr/ntq261

Blosnich, J. R., Lee, J. G., & Horn, K. (2013). A systematic review of the aetiology of tobacco disparities for sexual minorities. *Tobacco Control, 22*(2), 66-73. doi:10.1136/tobaccocontrol-2011-050181

Boehmer, U., Miao, X., Linkletter, C., & Clark, M. A. (2012). Adult health behaviors over the life course by sexual orientation. *American Journal of Public Health, 102*(2), 292-300. doi:10.2105/AJPH.2011.300334

Borland, R., Balmford, J., Bishop, N., Segan, C., Piterman, L., McKay-Brown, L., . . . Tasker, C. (2008). In-practice management versus quitline referral for enhancing smoking cessation in general practice: a cluster randomized trial. *Family Practice, 25*(5), 382-389. doi:10.1093/fampra/cmn046

Borrelli, B., Hayes, R. B., Dunsiger, S., & Fava, J. L. (2010). Risk perception and smoking behavior in medically ill smokers: a prospective study. *Addiction, 105*(6), 1100-1108. doi:10.1111/j.1360-0443.2010.02900.x

Bourdieu, P. (1989). Social space and symbolic power. *Sociological Theory, 7*(1), 14-25. doi:10.2307/202060

Brewster, K. L., & Tillman, K. H. (2012). Sexual orientation and substance use among adolescents and young adults. *American Journal of Public Health, 102*(6), 1168-1176. doi:10.2105/AJPH.2011.300261

Brooks, H., Llewellyn, C. D., Nadarzynski, T., Pelloso, F. C., De Souza Guilherme, F., Pollard, A., & Jones, C. J. (2018). Sexual orientation disclosure in health care: a systematic review. *British Journal of General Practice, 68*(668), e187-e196. doi:10.3399/bjgp18X694841

Burkhalter, J. E., Warren, B., Shuk, E., Primavera, L., & Ostroff, J. S. (2009). Intention to quit smoking among lesbian, gay, bisexual, and transgender smokers. *Nicotine and Tobacco Research, 11*(11), 1312-1320. doi:10.1093/ntr/ntp140

Burns, E. K., Deaton, E. A., & Levinson, A. H. (2011). Rates and reasons: disparities in low intentions to use a state smoking cessation quitline. *American Journal of Health Promotion, 25*(5 Suppl), S59-65. doi:10.4278/ajhp.100611-QUAN-183

Burns, M. N., Kamen, C., Lehman, K. A., & Beach, S. R. H. (2012). Minority stress and attributions for discriminatory events predict social anxiety in gay men. *Cognitive Therapy and Research, 36*(1), 25-35. doi:10.1007/s10608-010-9302-6

Cahill, S. R., Baker, K., Deutsch, M. B., Keatley, J., & Makadon, H. J. (2016). Inclusion of sexual orientation and gender identity in stage 3 meaningful use guidelines: a huge step forward for LGBT health. *LGBT Health, 3*(2), 100-102. doi:10.1089/lgbt.2015.0136

Callahan, E. J., Sitkin, N., Ton, H., Eidson-Ton, W. S., Weckstein, J., & Latimore, D. (2015). Introducing sexual orientation and gender identity into the electronic health record: one academic health center's experience. *Academic Medicine, 90*(2), 154-160. doi:10.1097/acm.0000000000000467

Cantrell, J., Pearson, J. L., Anesetti-Rothermel, A., Xiao, H., Kirchner, T. R., & Vallone, D. (2016). Tobacco retail outlet density and young adult tobacco initiation. *Nicotine and Tobacco Research 18*(2), 130-137. doi:10.1093/ntr/ntv036

Carpenter, C. J. (2010). A meta-analysis of the effectiveness of health belief model variables in predicting behavior. *Health Communication, 25*(8), 661-669. doi:10.1080/10410236.2010.521906

Carter, B. D., Abnet, C. C., Feskanich, D., Freedman, N. D., Hartge, P., Lewis, C. E., . . . Jacobs, E. J. (2015). Smoking and mortality--beyond established causes. *New England Journal of Medicine, 372*(7), 631-640. doi:10.1056/NEJMsa1407211

Centers for Disease Control and Prevention. (2013-2015). *National Health Interview Survey* [Data file and code book]. Retrieved from: https://www.cdc.gov/nchs/nhis/

Centers for Disease Control and Prevention. (2015). *Behavioral Risk Factor Surveillance System Overview: BRFSS 2015*. Retrieved from https://www.cdc.gov/brfss/annual_data/2015/pdf/overview_2015.pdf

Centers for Disease Control and Prevention. (n.d.). Tips From Former Smokers. Retrieved from http://www.cdc.gov/tobacco/campaign/tips/

Clark, T. T., Sparks, M. J., McDonald, T. M., & Dickerson, J. D. (2011). Post-tobacco master settlement agreement: Policy and practice implications for social workers. *Health & Social Work, 36*(3), 217-224.

Cochran, S. D., Bandiera, F. C., & Mays, V. M. (2013). Sexual orientation–related differences in tobacco use and secondhand smoke exposure among US adults aged 20 to 59 years: 2003–2010 National Health and Nutrition Examination Surveys. *American Journal of Public Health, 103*(10), 1837-1844. doi:10.2105/AJPH.2013.301423

Cochran, S. D., & Mays, V. M. (2017). Advancing the LGBT health research agenda: differential health trends within the lesbian, gay, and bisexual populations. *American Journal of Public Health, 107*(4), 497-498. doi:10.2105/ajph.2017.303677

Collins, R. (2004). *Interaction ritual chains*. Princeton, N.J.: Princeton University Press.

Cooley, C. H. (1902). *Human nature and the social order*. New York: Scribner.

Covey, L. S., Weissman, J., LoDuca, C., & Duan, N. (2009). A comparison of abstinence outcomes among gay/bisexual and heterosexual male smokers in an intensive, non-tailored smoking cessation study. *Nicotine and Tobacco Research, 11*(11), 1374-1377. doi:10.1093/ntr/ntp137

Craft, E. A., & Lee, J. D. (2002). Protecting one's self from a stigmatized disease... once one has it. *Deviant Behavior, 23*(3), 267-299. doi:10.1080/016396202753561248

Crenshaw, K. (1991). Mapping the margins: Intersectionality, identity politics, and violence against women of color. *Stanford Law Review, 43*(6), 1241-1299. doi:10.2307/1229039

Cummins, S. E., Bailey, L., Campbell, S., Koon-Kirby, C., & Zhu, S.-H. (2007). Tobacco cessation quitlines in North America: a descriptive study. *Tobacco Control, 16*, i9-i15. doi:10.1136/tc.2007.020370

Curran-Everett, D., & Milgrom, H. (2013). Post-hoc data analysis: benefits and limitations. *Current Opinion in Allergy and Clinical Immunology, 13*(3), 223-224. doi:10.1097/ACI.0b013e3283609831

Cutler, D. M., Huang, W., & Lleras-Muney, A. (2015). When does education matter? The protective effect of education for cohorts graduating in bad times. *Social Science & Medicine, 127,* 63-73. doi:https://doi.org/10.1016/j.socscimed.2014.07.056

Dahlhamer, J. M., Galinsky, A. M., Joestl, S. S., & Ward, B. W. (2014). Sexual orientation in the 2013 National Health Interview Survey: a quality assessment. *Vital Health Statistics 2*(169), 1-32.

Davis, K. C., Alexander, R. L., Jr., Shafer, P., Mann, N., Malarcher, A., & Zhang, L. (2015). The dose-response relationship between tobacco education advertising and calls to quitlines in the United States, March-June, 2012. *Preventing Chronic Disease, 12,* E191. doi:10.5888/pcd12.150157

Davis, K. C., Farrelly, M. C., Messeri, P., & Duke, J. (2009). The impact of national smoking prevention campaigns on tobacco-related beliefs, intentions to smoke and smoking initiation: results from a longitudinal survey of youth in the United States. *International Journal of Environmental Research and Public Health, 6*(2), 722-740. doi:10.3390/ijerph6020722

Davis, K. C., Shafer, P. R., Rodes, R., Kim, A., Hansen, H., Patel, D., . . . Beistle, D. (2016). Does digital video advertising increase population-level reach of multimedia campaigns? Evidence from the 2013 Tips From Former Smokers Campaign. *Journal of Medical Internet Research, 18*(9), e235. doi:10.2196/jmir.5683

Dickson-Spillmann, M., Sullivan, R., Zahno, B., & Schaub, M. P. (2014). Queer quit: a pilot study of a smoking cessation programme tailored to gay men. *BMC Public Health, 14*(126), 1-7. doi:10.1186/1471-2458-14-126

DiClemente, C. C. (1981). Self-efficacy and smoking cessation maintenance: a preliminary report. *Cognitive Therapy and Research, 5*(2), 175-187. doi:10.1007/bf01172525

Dilley, J. A., Spigner, C., Boysun, M. J., Dent, C. W., & Pizacani, B. A. (2008). Does tobacco industry marketing excessively impact lesbian, gay and bisexual communities? *Tobacco Control, 17*(6), 385-390. doi:10.1136/tc.2007.024216

Dohrenwend, B. P. (2000). The role of adversity and stress in psychopathology: Some evidence and its implications for theory and research. *Journal of Health and Social Behavior, 41*(1), 1-19. doi:10.2307/2676357

Donald, C., & Ehrenfeld, J. M. (2015). The opportunity for medical systems to reduce health disparities among lesbian, gay, bisexual, transgender and intersex patients. *Journal of Medical Systems, 39*(11), 178. doi:10.1007/s10916-015-0355-7

Duke, J. C., Davis, K. C., Alexander, R. L., MacMonegle, A. J., Fraze, J. L., Rodes, R. M., & Beistle, D. M. (2015). Impact of a U.S. antismoking national media campaign on beliefs, cognitions and quit intentions. *Health Education Research, 30*(3), 466-483. doi:10.1093/her/cyv017

Durso, L. E., & Meyer, I. H. (2013). Patterns and predictors of disclosure of sexual orientation to healthcare providers among lesbians, gay men, and bisexuals. *Sexuality Research and Social Policy, 10*(1), 35-42. doi:10.1007/s13178-012-0105-2

Eliason, M. J., Dibble, S. L., Gordon, R., & Soliz, G. B. (2012). The last drag: an evaluation of an LGBT-specific smoking intervention. *Journal of Homosexuality, 59*(6), 864-878. doi:10.1080/00918369.2012.694770

Emory, K., Buchting, F. O., Trinidad, D. R., Vera, L., & Emery, S. L. (2018). Lesbian, gay, bisexual, and transgender (LGBT) view it differently than non-LGBT: Exposure to tobacco-related couponing, e-cigarette advertisements, and anti-tobacco messages on social and traditional media. *Nicotine & Tobacco Research*. Advance online publication. doi:10.1093/ntr/nty049

England, L., Tong, V. T., Rockhill, K., Hsia, J., McAfee, T., Patel, D., . . . Davis, K. C. (2017). Evaluation of a federally funded mass media campaign and smoking cessation in pregnant women: a population-based study in three states. *BMJ Open, 7*(12). doi:10.1136/bmjopen-2017-016826

Evans-Polce, R. J., Castaldelli-Maia, J. M., Schomerus, G., & Evans-Lacko, S. E. (2015). The downside of tobacco control? Smoking and self-stigma: A systematic review. *Social Science & Medicine, 145*, 26-34. doi:10.1016/j.socscimed.2015.09.026

Fallin, A., Goodin, A., Lee, Y. O., & Bennett, K. (2015). Smoking characteristics among lesbian, gay, and bisexual adults. *Preventive Medicine, 74*, 123-130. doi:10.1016/j.ypmed.2014.11.026

Fallin, A., Goodin, A. J., & King, B. A. (2015). Menthol cigarette smoking among lesbian, gay, bisexual, and transgender adults. *American Journal of Preventive Medicine, 48*(1), 93-97. doi:10.1016/j.amepre.2014.07.044

Fallin, A., Lee, Y. O., Bennett, K., & Goodin, A. (2016). Smoking cessation awareness and utilization among lesbian, gay, bisexual, and transgender adults: an analysis of the 2009–2010 National Adult Tobacco Survey. *Nicotine and Tobacco Research, 18*(4), 496-500. doi:10.1093/ntr/ntv103

Fallin, A., Neilands, T. B., Jordan, J. W., & Ling, P. M. (2015). Social branding to decrease lesbian, gay, bisexual, and transgender young adult smoking. *Nicotine and Tobacco Research, 17*(8), 983-989. doi:10.1093/ntr/ntu265

Farmer, G. W., Bucholz, K. K., Flick, L. H., Burroughs, T. E., & Bowen, D. J. (2013). CVD risk among men participating in the National Health and Nutrition Examination Survey (NHANES) from 2001 to 2010: differences by sexual minority status. *Journal of Epidemiology and Community Health, 67*(9), 772-778. doi:10.1136/jech-2013-202658

Federal Trade Commission. (2015). *Cigarette report for 2012*. Retrieved from Washington, DC:

Fiore, M., Jaén, C. R., Baker, T. B., & et al. (2008). *Treating tobacco use and dependence: 2008 update*. Rockville, MD: U.S. Department of Health and Human Services. Public Health Service.

Foucault, M. (1978). *The history of sexuality* (Vol. 1st American). New York: Pantheon Books.

Fredriksen-Goldsen, K. I., Kim, H.-J., Barkan, S. E., Muraco, A., & Hoy-Ell, C. P. (2013). Health disparities among lesbian, gay, and bisexual older adults: Results from a population-based study. *American Journal of Public Health, 103*(10), 1802-1809. doi:10.2105/AJPH.2012.301110

Frost, D. M., Lehavot, K., & Meyer, I. H. (2013). Minority stress and physical health among sexual minority individuals. *Journal of Behavioral Medicine*. doi:10.1007/s10865-013-9523-8

Galupo, M. P., Henise, S. B., & Mercer, N. L. (2016). "The labels don't work very well": Transgender individuals' conceptualizations of sexual orientation and sexual identity. *International Journal of Transgenderism, 17*(2), 93-104. doi:10.1080/15532739.2016.1189373

Gamarel, K. E., Kahler, C. W., Lee, J. H., Reisner, S. L., Mereish, E. H., Matthews, A. K., & Operario, D. (2016). Sexual orientation disparities in smoking vary by sex and household smoking among US adults: Findings from the 2003–2012 National Health and Nutrition Examination Surveys. *Preventive Medicine, 82*, 1-6. doi:10.1016/j.ypmed.2015.10.008

German, D., Kodadek, L., Shields, R., Peterson, S., Snyder, C., Schneider, E., . . . Haider, A. (2016). Implementing sexual orientation and gender identity data collection in emergency departments: Patient and staff perspectives. *LGBT Health, 3*(6), 416-423. doi:10.1089/lgbt.2016.0069

Goffman, E. (1963). *Stigma; notes on the management of spoiled identity*. Englewood Cliffs, N.J: Prentice-Hall.

Grady, E. S., Humfleet, G. L., Delucchi, K. L., Reus, V. I., Muñoz, R. F., & Hall, S. M. (2014). Smoking cessation outcomes among sexual and gender minority and nonminority smokers in extended smoking treatments. *Nicotine and Tobacco Research, 16*(9), 1207-1215. doi:10.1093/ntr/ntu050

Graham, H. (2011). Smoking, stigma and social class. *Journal of Social Policy, 41*(1), 83-99. doi:10.1017/S004727941100033X

Grant, J., Mottet, L., Tanis, J., Herman, J., Harrison, J., & Keisling, M. (2010). *National transgender discrimination survey: Report on health and health care*. Washington, DC: National Center for Transgender Equality and the National Gay and Lesbian Task Force.

Green, K. E., & Feinstein, B. A. (2012). Substance use in lesbian, gay, and bisexual populations: An update on empirical research and implications for treatment. *Psychology of Addictive Behaviors, 26*(2), 265-278. doi:10.1037/a0025424

Gregor, K., & Borrelli, B. (2012). Barriers to quitting smoking among medically ill smokers. *Journal of Behavioral Medicine, 35*(5), 484-491. doi:10.1007/s10865-011-9376-y

Gruskin, E. P., Byrne, K. M., Altschuler, A., & Dibble, S. L. (2008). Smoking it all away: influences of stress, negative emotions, and stigma on lesbian tobacco use. *Journal Of LGBT Health Research, 4*(4), 167-179.

Guillory, J., Lisha, N., Lee, Y. O., & Ling, P. M. (2017). Phantom smoking among young adult bar patrons. *Tobacco Control, 26*(2), 153-157. doi:10.1136/tobaccocontrol-2015-052821

Guo, S., & Fraser, M. W. (2010). *Propensity score analysis: statistical methods and applications*. Thousand Oaks, California: Sage Publications.

Hamilton, C. J., & Mahalik, J. R. (2009). Minority stress, masculinity, and social norms predicting gay men's health risk behaviors. *Journal of Counseling Psychology, 56*(1), 132-141. doi:10.1037/a0014440

Harding, R., Bensley, J., & Corrigan, N. (2004). Targeting smoking cessation to high prevalence communities: outcomes from a pilot intervention for gay men. *BMC Public Health, 4*(43), 1-5. doi:10.1186/1471-2458-4-43

Hatzenbuehler, M. L. (2009). How does sexual minority stigma “get under the skin”? A psychological mediation framework. *Psychological Bulletin, 135*(5), 707-730. doi:10.1037/a0016441

Hatzenbuehler, M. L. (2014). Structural stigma and the health of lesbian, gay, and bisexual populations. *Current Directions in Psychological Science, 23*(2), 127-132. doi:10.1177/0963721414523775

Hatzenbuehler, M. L., Jun, H.-J., Corliss, H. L., & Austin, S. B. (2014). Structural stigma and cigarette smoking in a prospective cohort study of sexual minority and heterosexual youth. *Annals of Behavioral Medicine, 47*(1), 48-56. doi:10.1007/s12160-013-9548-9

Hatzenbuehler, M. L., Keyes, K. M., Hamilton, A., & Hasin, D. S. (2014). State-level tobacco environments and sexual orientation disparities in tobacco use and dependence in the USA. *Tobacco Control*. doi:10.1136/tobaccocontrol-2013-051279

Hatzenbuehler, M. L., McLaughlin, K. A., & Xuan, Z. (2015). Social networks and sexual orientation disparities in tobacco and alcohol use. *Journal of Studies on Alcohol and Drugs, 76*(1), 117-126. doi:http://dx.doi.org/10.15288/jsad.76.1.117

Hatzenbuehler, M. L., Nolen-Hoeksema, S., & Dovidio, J. (2009). How does stigma "get under the skin"?: the mediating role of emotion regulation. *Psychological Science, 20*(10), 1282-1289. doi:10.1111/j.1467-9280.2009.02441.x

Hatzenbuehler, M. L., Phelan, J. C., & Link, B. G. (2013). Stigma as a fundamental cause of population health inequalities. *American Journal of Public Health, 103*(5), 813-821. doi:10.2105/ajph.2012.301069

Hatzenbuehler, M. L., Wieringa, N. F., & Keyes, K. M. (2011). Community-level determinants of tobacco use disparities in lesbian, gay, and bisexual youth: results from a population-based study. *Archives of Pediatrics and Adolescent Medicine, 165*(6), 527-532. doi:10.1001/archpediatrics.2011.64

Hill, S., Amos, A., Clifford, D., & Platt, S. (2014). Impact of tobacco control interventions on socioeconomic inequalities in smoking: review of the evidence. *Tobacco Control, 23*(e2), e89-e97. doi:10.1136/tobaccocontrol-2013-051110

Holloway, I. W., Traube, D. E., Rice, E., Schrager, S. M., Palinkas, L. A., Richardson, J., & Kipke, M. D. (2012). Community and individual factors associated with cigarette smoking among young men who have sex with men. *Journal of Research on Adolescence, 22*(2), 199-205. doi:10.1111/j.1532-7795.2011.00774.x

Hosmer, D. W., Lemeshow, S., & Sturdivant, R. X. (2013). *Applied logistic regression* (3rd ed.). Hoboken, New Jersey: Wiley.

Huang, J., Kim, Y., Vera, L., & Emery, S. L. (2016). Electronic cigarettes among priority populations. *American Journal of Preventive Medicine, 50*(2), 199-209. doi:10.1016/j.amepre.2015.06.032

Hughes, J., Keely, J. P., Niaura, R. S., Ossip-Klein, D. J., Richmond, R. L., & Swan, G. E. (2003). Measures of abstinence in clinical trials: issues and recommendations. *Nicotine and Tobacco Research, 5*(1), 13-25. doi:10.1093/ntr/5.1.13

Hughes, T. L., Johnson, T. P., & Matthews, A. K. (2008). Sexual orientation and smoking: results from a multisite women's health study. *Substance Use and Misuse, 43*(8-9), 1218-1239. doi:10.1080/10826080801914170

Human Rights Campaign. (n.d., August 21, 2016). Our victories. Retrieved from http://www.hrc.org/hrc-story/our-victories

Hunter, S., & Hickerson, J. (2003). *Affirmative practice: understanding and working with lesbian, gay, bisexual, and transgender persons*. Washington, DC: NASW Press, National Association of Social Workers.

Institute of Medicine. (2011). *The health of lesbian, gay, bisexual, and transgender people: Building a foundation for better understanding*. Washington DC: The National Acadamies Press.

Inzlicht, M., McKay, L., & Aronson, J. (2006). Stigma as ego depletion: How being the target of prejudice affects self-control. *Psychological Science, 17*(3), 262-269. doi:10.1111/j.1467-9280.2006.01695.x

Jackson, C. L., Agénor, M., Johnson, D. A., Austin, S. B., & Kawachi, I. (2016). Sexual orientation identity disparities in health behaviors, outcomes, and services use among men and women in the United States: a cross-sectional study. *BMC Public Health, 16*(1), 807. doi:10.1186/s12889-016-3467-1

Jamal, A., Homa, D. M., O'Connor, E., Babb, S. D., Caraballo, R. S., Singh, T., . . . King, B. A. (2015). Current cigarette smoking among adults - United States, 2005-2014. *Morbidity and Mortality Weekly Report, 64*(44), 1233-1240.

Jamal, A., King, B. A., Neff, L. J., Whitmill, J., Babb, S. D., & Graffunder, C. M. (2016). Current cigarette smoking among adults — United States, 2005–2015. *Morbidity and Mortality Weekly Report, 65*(44), 1205–1211. doi:10.15585/mmwr.mm6544a2

Johns, M. M., Pingel, E. S., Youatt, E. J., Soler, J. H., McClelland, S. I., & Bauermeister, J. A. (2013). LGBT community, social network characteristics, and smoking behaviors in young sexual minority women. *American Journal of Community Psychology, 52*(1-2), 141-154. doi:10.1007/s10464-013-9584-4

Jones, E. E. (1984). *Social stigma: the psychology of marked relationships*. New York: W.H. Freeman.

Juster, R.-P., Smith, N. G., Ouellet, É., Sindi, S., & Lupien, S. J. (2013). Sexual orientation and disclosure in relation to psychiatric symptoms, diurnal cortisol, and allostatic load. *Psychosomatic Medicine, 75*(2), 103-116. doi:10.1097/PSY.0b013e3182826881

Kim, J., Cao, X., & Meczkowski, E. (2018). Does stigmatization motivate people to quit smoking? Examining the effect of stigmatizing anti-smoking campaigns on cessation intention. *Health Communication, 33*(6), 681-689. doi:10.1080/10410236.2017.1299275

King, B. A., Dube, S. R., & Tynan, M. A. (2013). Flavored cigar smoking among U.S. adults: findings from the 2009-2010 National Adult Tobacco Survey. *Nicotine and Tobacco Research, 15*(2), 608-614. doi:10.1093/ntr/nts178

Kingsbury, J. H., Parks, M. J., Amato, M. S., & Boyle, R. G. (2016). Deniers and admitters: Examining smoker identities in a changing tobacco landscape. *Nicotine and Tobacco Research, 18*(11), 2130-2137. doi:10.1093/ntr/ntw110

Koester, K. A., Collins, S. P., Fuller, S. M., Galindo, G. R., Gibson, S., & Steward, W. T. (2013). Sexual healthcare preferences among gay and bisexual men: a qualitative study in San Francisco, California. *Plos One, 8*(8), e71546. doi:10.1371/journal.pone.0071546

Kozlowski, L. T., Porter, C. Q., Orleans, C. T., Pope, M. A., & Heatherton, T. (1994). Predicting smoking cessation with self-reported measures of nicotine dependence: FTQ, FTND, and HSI. *Drug and alcohol dependence*, *34*(3), 211-216.

Lambda Legal. (2010). *When health care isn't caring: Lambda Legal's survey of discrimination against LGBT people and people with HIV*. Retrieved from www.lambdalegal.org/health-care-report. Accessed 30 April 2018.

Lazarus, R., & Folkman, S. (1984). *Stress, appraisal, and coping*. New York, New York: Spring Publishing Company, Inc.

Lee, J. G. L., Blosnich, J. R., & Melvin, C. L. (2012). Up in smoke: vanishing evidence of tobacco disparities in the Institute of Medicine's report on sexual and gender minority health. *American Journal of Public Health, 102*(11), 2041-2043. doi:10.2105/AJPH.2012.300746

Lee, J. G. L., DeMarco, M. E., Beymer, M. R., Shover, C. L., & Bolan, R. K. (2018). Tobacco-free policies and tobacco cessation systems at health centers serving lesbian, gay, bisexual, and transgender clients. *LGBT Health.* Advance online publication. doi:10.1089/lgbt.2017.0208

Lee, J. G. L., Griffin, G. K., & Melvin, C. L. (2009). Tobacco use among sexual minorities in the USA, 1987 to May 2007: a systematic review. *Tobacco Control, 18*(4), 275-282. doi:10.1136/tc.2008.028241

Lee, J. G. L., Landrine, H., Martin, R. J., Matthews, D. D., Averett, P. E., & Niederdeppe, J. (2017). Reasons for caution when emphasizing health disparities for sexual and gender minority adults in public health campaigns. *American Journal of Public Health, 107*(8), 1223-1225. doi:10.2105/ajph.2017.303883

Lee, J. G. L., Matthews, A. K., McCullen, C. A., & Melvin, C. L. (2014). Promotion of tobacco use cessation for lesbian, gay, bisexual, and transgender people. *American Journal of Preventive Medicine, 47*(6), 823-831. doi:10.1016/j.amepre.2014.07.051

Lee, J. G. L., Pan, W. K., Henriksen, L., Goldstein, A. O., & Ribisl, K. M. (2015). Is there a relationship between the concentration of same-sex couples and tobacco retailer density? *Nicotine and Tobacco Research, 18*(2), 147-155. doi:10.1093/ntr/ntv046

Legacy. (2012). *Tobacco control in LGBT communities*. Washington, DC: Legacy.

Leibel, K., Lee, J. G., Goldstein, A. O., & Ranney, L. M. (2011). Barring intervention? Lesbian and gay bars as an underutilized venue for tobacco interventions. *Nicotine and Tobacco Research, 13*(7), 507-511. doi:10.1093/ntr/ntr065

Levinson, A. H., Hood, N., Mahajan, R., & Russ, R. (2012). Smoking cessation treatment preferences, intentions, and behaviors among a large sample of Colorado gay, lesbian, bisexual, and transgendered smokers. *Nicotine and Tobacco Research, 14*(8), 910-918. doi:10.1093/ntr/ntr303

Link, B. G., & Phelan, J. C. (2001). Conceptualizing stigma. *Annual Review of Sociology, 27*(1), 363-385. doi:doi:10.1146/annurev.soc.27.1.363

Link, B. G., Phelan, J. C., & Hatzenbuehler, M. L. (2014). Stigma and Social Inequality. In D. J. McLeod, J. E. Lawler, & M. Schwalbe (Eds.), *Handbook of the social psychology of inequality* (pp. 49-64). Dordrecht: Springer Netherlands.

Lukowski, A. V., Morris, C., Young, S. E., & Tinkelman, D. (2017). Characteristics of LGBT quitline callers across 14 states. *Journal of Smoking Cessation,12*(4), 183-189. doi:10.1017/jsc.2016.18

Lunn, M. R., Cui, W., Zack, M. M., Thompson, W. W., Blank, M. B., & Yehia, B. R. (2017). Sociodemographic characteristics and health outcomes among lesbian, gay, and bisexual U.S. adults using Healthy People 2020 leading health indicators. *LGBT Health, 4*(4), 283-294. doi:10.1089/lgbt.2016.0087

Major, B., & O'Brien, L. T. (2005). The social psychology of stigma. *Annual Review of Psychology, 56*(1), 393-421. doi:10.1146/annurev.psych.56.091103.070137

Martos, A. J., Wilson, P. A., & Meyer, I. H. (2017). Lesbian, gay, bisexual, and transgender (LGBT) health services in the United States: Origins, evolution, and contemporary landscape. *Plos One, 12*(7), e0180544. doi:10.1371/journal.pone.0180544

Matthews, A. K., Balsam, K., Hotton, A., Kuhns, L., Li, C. C., & Bowen, D. J. (2014). Awareness of media-based antitobacco messages among a community sample of LGBT individuals. *Health Promotion Practice, 15*(6), 857-866. doi:10.1177/1524839914533343

Matthews, A. K., Conrad, M., Kuhns, L., Vargas, M., & King, A. C. (2013). Project Exhale: Preliminary evaluation of a tailored smoking cessation treatment for HIV-positive African American smokers. *AIDS Patient Care and STDs, 27*(1), 22-32. doi:10.1089/apc.2012.0253

Matthews, A. K., Hotton, A., DuBois, S., Fingerhut, D., & Kuhns, L. M. (2011). Demographic, psychosocial, and contextual correlates of tobacco use in sexual minority women. *Research in Nursing and Health, 34*(2), 141-152. doi:10.1002/nur.20427

Matthews, A. K., Li, C.-C., Kuhns, L. M., Tasker, T. B., & Cesario, J. A. (2013). Results from a community-based smoking cessation treatment program for LGBT smokers. *Journal Of Environmental and Public Health, 2013*, 984508-984508. doi:10.1155/2013/984508

Matthews, A. K., Riley, B. B., Everett, B., Hughes, T. L., Aranda, F., & Johnson, T. (2014). A longitudinal study of the correlates of persistent smoking among sexual minority women. *Nicotine and Tobacco Research, 16*(9), 1199-1206. doi:10.1093/ntr/ntu051

Mays, V. M., & Cochran, S. D. (2001). Mental health correlates of perceived discrimination among lesbian, gay, and bisexual adults in the United States. *American Journal of Public Health, 91*(11), 1869-1876.

McAfee, T., Davis, K. C., Alexander, R. L., Jr., Pechacek, T. F., & Bunnell, R. (2013). Effect of the first federally funded US antismoking national media campaign. *The Lancet, 382*(9909), 2003-2011. doi:10.1016/S0140-6736(13)61686-4

McAfee, T., Davis, K. C., Shafer, P., Patel, D., Alexander, R., & Bunnell, R. (2017). Increasing the dose of television advertising in a national antismoking media campaign: Results from a randomised field trial. *Tobacco Control, 26*(1), 19-28. doi:10.1136/tobaccocontrol-2015-052517

McEwen, B. S., & Wingfield, J. C. (2003). The concept of allostasis in biology and biomedicine. *Hormones and Behavior, 43*(1), 2-15. doi:10.1016/S0018-506X(02)00024-7

Mendez, D., Tam, J., Giovino, G. A., Tsodikov, A., & Warner, K. E. (2017). Has smoking cessation increased? An examination of the US adult smoking cessation rate 1990 - 2014. *Nicotine and Tobacco Research, 19*(12), 1418-1424. doi:10.1093/ntr/ntw239

Meyer, I. H. (1995). Minority stress and mental health in gay men. *Journal of Health and Social Behavior, 36*(1), 38-56. doi:10.2307/2137286

Meyer, I. H. (2003). Prejudice, social stress, and mental health in lesbian, gay, and bisexual populations: Conceptual issues and research evidence. *Psychological Bulletin, 129*(5), 674-697. doi:10.1037/0033-2909.129.5.674

Meyer, I. H., & Frost, D. M. (2013). Minority stress and the health of sexual minorities. In C. J. Patterson & A. R. D'Augelli (Eds.), *Handbook of psychology and sexual orientation* (pp. 320-266). New York, NY: Oxford University Press.

Meyer, I. H., Schwartz, S., & Frost, D. M. (2008). Social patterning of stress and coping: Does disadvantaged social statuses confer more stress and fewer coping resources? *Social Science and Medicine, 67*(3), 368-379. doi:10.1016/j.socscimed.2008.03.012

Miller, C. T., & Kaiser, C. R. (2001). A theoretical perspective on coping with stigma. *Journal of Social Issues, 57*(1), 73-92. doi:10.1111/0022-4537.00202

Miller, D. P., Bazzi, A. R., Allen, H. L., Martinson, M. L., Salas-Wright, C. P., Jantz, K., . . . Rosenbloom, D. L. (2017). A social work approach to policy: Implications for population health. *American Journal of Public Health, 107*(S3), S243-S249. doi:10.2105/ajph.2017.304003

NAQC. (2009). *Measuring quit rates*. Phoenix, AZ: NAQC.

NAQC. (2011). *The use of quitlines among priority populations in the U.S.: Lessons from the scientific evidence*. Oakland, CA: NAQC.

NAQC. (2012). *The minimal data set for evaluating quitlines*. Phoenix, AZ: NAQC.

NAQC. (2015). *Calculating quit rates, 2015 update*. Phoenix, AZ: NAQC.

NAQC. (2016). *Results from the FY2015 NAQC annual survey of quitlines [Powerpoint presentation]*. Retrieved from http://c.ymcdn.com/sites/www.naquitline.org/resource/resmgr/2015_Survey/finalweb2242016NAQCFY2015.pdf

National Association of Social Workers. (2008). *Code of Ethics of the National Association of Social Workers*. Washington, DC: NASW.

National Association of Social Workers. (2015). Standards for practice and indicators for cultural competence in social work practice. Washington, DC: NASW.

National Center for Health Statistics. (2017). *Health, United States, 2016: With chartbook on long-term trends in health*. Hyattsville, MD.

Newcomb, M. E., Heinz, A. J., Birkett, M., & Mustanski, B. (2014). A longitudinal examination of risk and protective factors for cigarette smoking among lesbian, gay, bisexual, and transgender youth. *Journal of Adolescent Health, 54*(5), 558-564. doi:10.1016/j.jadohealth.2013.10.208

Offen, N., Smith, E. A., & Malone, R. E. (2003). From adversary to target market: the ACT-UP boycott of Philip Morris. *Tobacco Control, 12*(2), 203-207.

Ossip-Klein, D. J., & McIntosh, S. (2003). Quitlines in North America: Evidence base and applications. *The American Journal of the Medical Sciences, 326*(4), 201-205. doi:10.1097/00000441-200310000-00010

Pachankis, J. E. (2007). The psychological implications of concealing a stigma: a cognitive-affective-behavioral model. *Psychological Bulletin, 133*(2), 328-345. doi:10.1037/0033-2909.133.2.328

Pachankis, J. E., Hatzenbuehler, M. L., & Starks, T. J. (2014). The influence of structural stigma and rejection sensitivity on young sexual minority men's daily tobacco and alcohol use. *Social Science and Medicine, 103*, 67-75. doi:10.1016/j.socscimed.2013.10.005

Pachankis, J. E., Westmaas, J. L., & Dougherty, L. R. (2011). The influence of sexual orientation and masculinity on young men's tobacco smoking. *Journal of Consulting and Clinical Psychology, 79*(2), 142-152. doi:10.1037/a0022917

Pearlin, L. I. (2010). The life course and the stress process: Some conceptual comparisons. *The Journals of Gerontology Series B: Psychological Sciences and Social Sciences, 65B*(2), 207-215. doi:10.1093/geronb/gbp106

Pearlin, L. I., & Bierman, A. (2013). Current issues and future directions in research into the stress process. In C. S. Aneshensel, J. C. Phelan, & A. Bierman (Eds.), *Handbook of the Sociology of Mental Health* (pp. 325-340). Dordrecht: Springer Netherlands.

Pearlin, L. I., Menaghan, E. G., Lieberman, M. A., & Mullan, J. T. (1981). The stress process. *Journal of Health and Social Behavior, 22*(4), 337-356. doi:10.2307/2136676

Pearlin, L. I., Schieman, S., Fazio, E. M., & Meersman, S. C. (2005). Stress, health, and the life course: Some conceptual perspectives. *Journal of Health and Social Behavior, 46*(2), 205-219. doi:10.1177/002214650504600206

Perkins, K. A., Parzynski, C., Mercincavage, M., Conklin, C. A., & Fonte, C. A. (2012). Is self-efficacy for smoking abstinence a cause of, or a reflection on, smoking behavior change? *Experimental and Clinical Psychopharmacology, 20*(1), 56-62. doi:10.1037/a0025482

Phelan, J. C., Link, B. G., & Dovidio, J. F. (2008). Stigma and prejudice: One animal or two? *Social Science & Medicine, 67*(3), 358-367. doi:10.1016/j.socscimed.2008.03.022

Phillips, J. C., Rowsell, D. J., Boomer, J., Kwon, J.-Y., & Currie, L. M. (2016). Personas to guide understanding traditions of gay men living with HIV who smoke. *Qualitative Health Research, 26*(1), 41-54. doi:10.1177/1049732315581614

Piper, M. E., Baker, T. B., Mermelstein, R., Collins, L. M., Fraser, D. L., Jorenby, D. E., . . . Fiore, M. C. (2013). Recruiting and engaging smokers in treatment in a primary care setting: developing a chronic care model implemented through a modified electronic health record. *Translational Behavioral Medicine, 3*(3), 253-263. doi:10.1007/s13142-012-0178-8

Pizacani, B. A., Rohde, K., Bushore, C., Stark, M. J., Maher, J. E., Dilley, J. A., & Boysun, M. J. (2009). Smoking-related knowledge, attitudes and behaviors in the lesbian, gay and bisexual community: a population-based study from the U.S. Pacific Northwest. *Preventive Medicine, 48*(6), 555-561. doi:10.1016/j.ypmed.2009.03.013

Poland, B., Frohlich, K., Haines, R. J., Mykhalovskiy, E., Rock, M., & Sparks, R. (2006). The social context of smoking: the next frontier in tobacco control? *Tobacco Control, 15*(1), 59-63. doi:10.1136/tc.2004.009886

Rath, J. M., Villanti, A. C., Rubenstein, R. A., & Vallone, D. M. (2013). Tobacco use by sexual identity among young adults in the United States. *Nicotine and Tobacco Research, 15*(11), 1822-1831. doi:10.1093/ntr/ntt062

Regan, S., Reid, Z. Z., Kelley, J. H. K., Reyen, M., Korotkin, M., Japuntich, S. J., . . . Rigotti, N. A. (2016). Smoking status confirmation by proxy: Validation in a smoking cessation trial. *Nicotine and Tobacco Research, 18*(1), 34-40. doi:10.1093/ntr/ntv073

Robinson, W. T., Brown, M. C., & Moody-Thomas, S. (2014). Smoking and experiences with tobacco cessation among men who have sex with men: New Orleans, 2011. *AIDS Behavior, 18 Suppl 3*, 324-332. doi:10.1007/s10461-013-0585-y

Rosario, M., Reisner, S. L., Corliss, H. L., Wypij, D., Calzo, J., & Austin, S. B. (2014). Sexual-orientation disparities in substance use in emerging adults: A function of stress and attachment paradigms. *Psychology of Addictive Behaviors, 28*(3), 790-804. doi:10.1037/a0035499

Rosario, M., Schrimshaw, E. W., & Hunter, J. (2008). Butch/Femme differences in substance use and abuse among young lesbian and bisexual women: Examination and potential explanations. *Substance Use and Misuse, 43*(8-9), 1002-1015. doi:10.1080/10826080801914402

Rosario, M., Schrimshaw, E. W., & Hunter, J. (2009). Disclosure of sexual orientation and subsequent substance use and abuse among lesbian, gay, and bisexual youths: Critical role of disclosure reactions. *Psychology of Addictive Behaviors, 23*(1), 175-184. doi:10.1037/a0014284

Rosenbaum, P. R., & Rubin, D. B. (1983). The central role of the propensity score in observational studies for causal effects. *Biometrika, 70*(1), 41-55. doi:10.2307/2335942

Rosenbaum, P. R., & Rubin, D. B. (1984). Reducing bias in observational studies using subclassification on the propensity score. *Journal of the American Statistical Association, 79*(387), 516-524. doi:10.2307/2288398

Rosenstock, I. M. (1966). Why people use health services. *Milbank Memorial Fund Quarterly, 44*(3), Suppl:94-127.

Rostosky, S. S., Danner, F., & Riggle, E. D. (2007). Is religiosity a protective factor against substance use in young adulthood? Only if you're straight! *Journal of Adolescent Health, 40*(5), 440-447. doi:10.1016/j.jadohealth.2006.11.144

Rubin, D. B. (1986). Which ifs have causal answers. *Journal of the American Statistical Association, 81*(396), 961-962. doi:10.2307/2289065

Rubin, D. B. (1997). Estimating causal effects from large data sets using propensity scores. *Annals of Internal Medicine, 127*(8 Pt 2), 757-763.

Ryan, H., Wortley, P. M., Easton, A., Pederson, L., & Greenwood, G. (2001). Smoking among lesbians, gays, and bisexuals: a review of the literature. *American Journal of Preventive Medicine, 21*(2), 142-149.

Sabin, J. A., Riskind, R. G., & Nosek, B. A. (2015). Health care providers' implicit and explicit attitudes toward lesbian women and gay men. *American Journal of Public Health, 105*(9), 1831-1841. doi:10.2105/ajph.2015.302631

Schwappach, D. L. B. (2008). Smoking behavior, intention to quit, and preferences toward cessation programs among gay men in Zurich, Switzerland. *Nicotine and Tobacco Research, 10*(12), 1783-1787. doi:10.1080/14622200802443502

Schwappach, D. L. B. (2009). Queer quit: Gay smokers' perspectives on a culturally specific smoking cessation service. *Health Expectations, 12*(4), 383-395. doi:10.1111/j.1369-7625.2009.00550.x

Seidenberg, A., Jo, C., Ribisl, K., Lee, J., Buchting, F., Kim, Y., & Emery, S. (2017). A national study of social media, television, radio, and internet usage of adults by sexual orientation and smoking status: Implications for campaign design. *International Journal of Environmental Research and Public Health, 14*(4), 450.

Sell, R. L. (2007). Defining and measuring sexual orientation for research. In I. H. Meyer & M. E. Northridge (Eds.), *The health of sexual minorities: Public health perspectives on lesbian, gay, bisexual and transgender populations* (pp. 355-374). Boston, MA: Springer US.

Sheffer, C. E., Stitzer, M., Landes, R., Brackman, S. L., Munn, T., & Moore, P. (2012). Socioeconomic disparities in community-based treatment of tobacco dependence. *American Journal of Public Health, 102*(3), e8-e16. doi:10.2105/AJPH.2011.300519

Skinner, M. D., & Aubin, H.-J. (2010). Craving's place in addiction theory: Contributions of the major models. *Neuroscience and Biobehavioral Reviews, 34*(4), 606-623. doi:10.1016/j.neubiorev.2009.11.024

Smart, L., & Wegner, D. M. (1999). Covering up what can't be seen: concealable stigma and mental control. *Journal of Personality and Social Psychology, 77*(3), 474-486.

Smith, E. A., Offen, N., & Malone, R. E. (2005). What makes an ad a cigarette ad? Commercial tobacco imagery in the lesbian, gay, and bisexual press. *Journal of Epidemiology and Community Health, 59*(12), 1086-1091. doi:10.1136/tc.12.suppl_3.iii95

Smith, E. A., Thomson, K., Offen, N., & Malone, R. E. (2008). "If you know you exist, it's just marketing poison": Meanings of tobacco industry targeting in the lesbian, gay, bisexual, and transgender community. *American Journal of Public Health, 98*(6), 996-1003. doi:10.2105/AJPH.2007.118174

Stead, L. F., Hartmann-Boyce, J., Perera, R., & Lancaster, T. (2013). Telephone counselling for smoking cessation. *Cochrane Database of Systematic Reviews*. doi:10.1002/14651858.CD002850.pub3

Stevens, P., Carlson, L. M., & Hinman, J. M. (2004). An analysis of tobacco industry marketing to lesbian, gay, bisexual, and transgender (LGBT) populations: Strategies for mainstream tobacco control and prevention. *Health Promotion Practice, 5*(3 Suppl), 129S-134S. doi:10.1177/1524839904264617

Stryker, S. (1968). Identity salience and role performance: The relevance of symbolic interaction theory for family research. *Journal of Marriage and Family, 30*(4), 558-564. doi:10.2307/349494

Stuber, J., Galea, S., & Link, B. G. (2008). Smoking and the emergence of a stigmatized social status. *Social Science and Medicine, 67*(3), 420-430. doi:10.1016/j.socscimed.2008.03.010

Sue, D. W. (2010). *Microaggressions in everyday life: race, gender, and sexual orientation*. Hoboken, N.J: Wiley.

Tang, H., Greenwood, G. L., Cowling, D. W., Lloyd, J. C., Roeseler, A. G., & Bal, D. G. (2004). Cigarette smoking among lesbians, gays, and bisexuals: How serious a problem? *Cancer Causes Control, 15*(8), 797-803. doi:10.1023/B:CACO.0000043430.32410.69

Taylor, G. M. J., Dalili, M. N., Semwal, M., Civljak, M., Sheikh, A., & Car, J. (2017). Internet-based interventions for smoking cessation. *Cochrane Database of Systematic Reviews* (9). doi:10.1002/14651858.CD007078.pub5

Terry, J. (1999). *An American obsession: Science, medicine, and homosexuality in modern society*. Chicago: University of Chicago Press.

Tervalon, M., & Murray-Garcia, J. (1998). Cultural humility versus cultural competence: a critical distinction in defining physician training outcomes in multicultural education. *Journal of Health Care for the Poor and Underserved, 9*(2), 117-125.

Thoits, P. A. (1985). Self-labeling processes in mental illness: The role of emotional deviance. *American Journal of Sociology, 91*(2), 221-249.

Thoits, P. A. (1999). Self, identity, stress, and mental health. In C. Aneshensel & J. Phelan (Eds.), *Handbook of the sociology of mental health* (pp. 345-368). New York: Kluwer Academic/Plenum.

Thoits, P. A. (2011). Mechanisms linking social ties and support to physical and mental health. *Journal of Health and Social Behavior, 52*(2), 145-161. doi:10.1177/0022146510395592

Tindle, H. A., Daigh, R., Reddy, V. K., Bailey, L. A., Ochs, J. A., Maness, M. H., . . . Pennsylvania eReferral, W. (2016). eReferral between hospitals and quitlines: An emerging tobacco control strategy. *American Journal of Preventive Medicine, 51*(4), 522-526. doi:10.1016/j.amepre.2016.05.024

U.S. Department of Health and Human Services. (March 3, 2015). Healthy People 2020. Retrieved from https://www.healthypeople.gov/2020/leading-health-indicators/2020-lhi-topics/Tobacco/data

U.S. Department of Health and Human Services. (2014). *The health consequences of smoking—50 years of progress: A report of the Surgeon General*. Atlanta, GA: U.S. Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health.

Vidrine, J., Shete, S., Cao, Y., & et al. (2013). Ask-advise-connect: A new approach to smoking treatment delivery in health care settings. *JAMA Internal Medicine, 173*(6), 458-464. doi:10.1001/jamainternmed.2013.3751

Walls, N. E., & Wisneski, H. (2011). Evaluation of smoking cessation classes for the lesbian, gay, bisexual, and transgender community. *Journal of Social Service Research, 37*(1), 99-111. doi:10.1080/01488376.2011.524531

Warner, L. M., Stadler, G., Lüscher, J., Knoll, N., Ochsner, S., Hornung, R., & Scholz, U. (2018). Day-to-day mastery and self-efficacy changes during a smoking quit attempt: Two studies. *British Journal of Health Psychology, 23*(2), 371-386. doi:doi:10.1111/bjhp.12293

Washington, H. A. (2002). Burning love: Big tobacco takes aim at LGBT youths. *American Journal of Public Health, 92*(7), 1086-1095.

West, R., & Brown, J. (2014). *Theory of addiction* (Vol. Second). Chichester, West Sussex, UK: Wiley Blackwell/Addiction Press.

Wheeler, D. P., & Dodd, S.-J. (2011). LGBTQ capacity building in health care systems: A social work imperative. *Health and Social Work, 36*(4), 307-309. doi:10.1093/hsw/36.4.307

Whittaker, R., McRobbie, H., Bullen, C., Rodgers, A., & Gu, Y. (2016). Mobile phone-based interventions for smoking cessation. *Cochrane Database of Systematic Reviews, 4*, Cd006611. doi:10.1002/14651858.CD006611.pub4

Wight, R. G., LeBlanc, A. J., de Vries, B., & Detels, R. (2012). Stress and mental health among midlife and older gay-identified men. *American Journal of Public Health, 102*(3), 503-510. doi:10.2105/AJPH.2011.300384

Willoughby, B. L. B., Lai, B. S., Doty, N. D., Mackey, E. R., & Malik, N. M. (2008). Peer crowd affiliations of adult gay men: Linkages with health risk behaviors. *Psychology of Men and Masculinity, 9*(4), 235-247. doi:10.1037/1524-9220.9.4.235

World Health Organization. (2008). *WHO report on the global tobacco epidemic, 2008 - The MPOWER package*. Geneva, Switzerland: WHO.

Wright, E. R., & Perry, B. L. (2006). Sexual identity distress, social support, and the health of gay, lesbian, and bisexual youth. *Journal of Homosexuality, 51*(1), 81-110. doi:10.1300/J082v51n01_05

Xu, X., Alexander, R. L., Jr., Simpson, S. A., Goates, S., Nonnemaker, J. M., Davis, K. C., & McAfee, T. (2015). A cost-effectiveness analysis of the first federally funded antismoking campaign. *American Journal of Preventive Medicine, 48*(3), 318-325. doi:10.1016/j.amepre.2014.10.011

Ylioja, T., Cochran, G., Woodford, M. R., & Renn, K. A. (2018). Frequent experience of LGBQ microaggression on campus associated with smoking among sexual minority college students. *Nicotine and Tobacco Research, 20*(3), 340-346. doi:10.1093/ntr/ntw305

Ylioja, T., & Craig, S. L. (2014). Exclusionary health policy: responding to the risk of poor health among sexual minority youth in Canada. *Social Work in Public Health, 29*(1), 81-86. doi:10.1080/19371918.2011.619936

Ylioja, T., Reddy, V., Ambrosino, R., Davis, E. M., Douaihy, A., Slovenkay, K., . . . Tindle, H. A. (2017). Using bioinformatics to treat hospitalized smokers: Successes and challenges of a tobacco treatment service. *Joint Commission Journal on Quality and Patient Safety, 43*(12), 621-632. doi:10.1016/j.jcjq.2017.06.010

Zhao, X., & Cai, X. (2016). The association between exposure to "Tips" and smoking-related outcomes among adolescents in the United States. *Health Education Research, 31*(5), 614-623. doi:10.1093/her/cyw037