Drug and Alcohol Dependence 198 (2019) 63–69

Contents lists available at ScienceDirect

Drug and Alcohol Dependence

journal homepage: www.elsevier.com/locate/drugalcdep

Full length article

Everyday discrimination indirectly influences smoking cessation through post-quit self-efficacy

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ARTICLE INFO

Keywords:
Discrimination
Self-efficacy
Smoking cessation
Socioeconomic status
Mediation

ABSTRACT

Background: Although studies have shown an association between discrimination and current smoking, the influence of discrimination on smoking cessation is an understudied area in tobacco research. The current study evaluated the influence of everyday discrimination on smoking cessation and examined self-efficacy as a potential mediator of this association.

Methods: Participants (N = 146), who were recruited from a safety-net hospital in Dallas County, Texas, from 2011 to 2013, completed a self-report measure of perceived discrimination one week before the scheduled quit attempt and self-efficacy for quitting was assessed one day after the scheduled quit date. Biochemically-verified 7-day point prevalence abstinence was assessed weekly, through the fourth week after the scheduled quit date. Structural equation modeling was used to evaluate the indirect effect of perceived discrimination on smoking cessation via self-efficacy for quitting.

Results: Analyses indicated significant indirect effect of discrimination on smoking cessation through self-efficacy at Weeks 1 (B = .09, SE = .04, p = .02) and 4 (B = .07, SE = .03, p = .03). A higher frequency of discrimination was associated with lower self-efficacy one day after the scheduled quit date, and lower self-efficacy increased the likelihood of smoking one and four weeks after the scheduled quit attempt.

Conclusions: Findings suggest that perceptions of discrimination reduce the likelihood of smoking cessation via diminished self-efficacy. Future research is needed to identify intervention strategies to reduce the frequency of discrimination experiences and attenuate the negative impact of discrimination and low self-efficacy on smoking cessation.

1. Introduction

In 2015, nearly 70% of adults who smoked reported a desire to quit smoking completely (Babb et al., 2017), and 55% stopped smoking for more than one day indicating a serious quit attempt (Gitchell et al., 2017). However, smoking cessation is a complicated and challenging process, and individuals rarely succeed the first time they attempt to quit. Individuals who successfully quit smoking make about 30 or more quit attempts before finally quitting (Chaiton et al., 2016). During a quit attempt, people experience a variety of physical and psychological changes, such as increased cigarette cravings and urges to smoke (Van Zundert et al., 2012; Vasilenko et al., 2014), and negative affect (Shiffman and Waters, 2004; Zuo et al., 2017), which influence their likelihood of achieving abstinence. Along with these changes, many adults live and work in stressful environments, and elevated stress is often cited as a critical risk factor for relapse after a quit attempt (Slopen et al., 2013, 2012).

Discrimination—an uncontrollable and unpredictable social stressor that is often characterized by perceptions of unfair treatment based on a person's characteristics, such as race/ethnicity or sexual orientation (Lewis et al., 2015; Williams and Mohammed, 2009)— is a unique stressor because, unlike other stressors, it is often reported among vulnerable populations in society and is embedded within systems of inequality and transmitted culturally (Perry et al., 2013). Discrimination has not been adequately examined as a risk factor for smoking after a quit attempt even though research has demonstrated a robust association between discrimination and current smoking (Chavez et al., 2015; Parker et al., 2017, 2016; Purnell et al., 2012). To date, only one study has examined the influence of discrimination on smoking cessation. Kendzor et al. (2014) prospectively evaluated the associations of everyday and major discrimination on smoking cessation among a sample of 190 Spanish speaking adults of Mexican heritage making a

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https://doi.org/10.1016/j.drugalcdep.2019.01.033
Received 26 October 2018; Received in revised form 17 January 2019; Accepted 18 January 2019
Available online 28 February 2019
0376-8716/

quit attempt. Everyday discrimination did not predict smoking abstinence, but reporting one or more major discrimination events before quitting decreased the likelihood of achieving abstinence at 26 weeks post-quit date. However, it is unclear whether these findings are generalizable to other populations, such as African Americans. African Americans report frequently experiencing both everyday and major discrimination (Boutwell et al., 2017; Kendzor et al., 2014b), which also impacts their health more substantially compared to Hispanics (Hausmann et al., 2008).

Uncovering the mechanisms linking discrimination with smoking cessation outcomes may inform intervention approaches and improve cessation outcomes. Self-efficacy may be one such mechanism, given research showing that experiencing discrimination lowers self-efficacy (Lee and Ahn, 2012; Wells, 2016). Further, self-efficacy, across many cross-sectional and prospective studies, is a consistent predictor of smoking cessation outcomes (Businelle et al., 2013, 2010; Gwaltney et al., 2009; Pinsker et al., 2018). Evidence for self-efficacy as a mechanism linking discrimination and smoking cessation outcomes was suggested in a cross-sectional study of low-income African Americans with hypertension (Richardson et al., 2014). Richardson et al. found that African Americans who reported any weight-based discrimination had lower self-efficacy, which was measured as the belief in one's own ability to take antihypertensive medications in a variety of situations, and higher odds of medication non-adherence than African Americans who did not report weight-based discrimination (OR = 1.94 [95% CI = 1.41, 2.67]). Though it remains to be tested, self-efficacy may be one pathway through which discrimination influences smoking cessation.

Therefore, this study explored whether perceptions of discrimination indirectly influenced the likelihood of smoking cessation through changes in self-efficacy. It was hypothesized that greater pre-quit perceptions of discrimination frequency would be directly associated with lower self-efficacy for quitting and a reduced likelihood of achieving smoking abstinence, and that discrimination would indirectly influence the likelihood of smoking via diminished self-efficacy. Findings could illuminate one mechanism through which discrimination negatively impacts health, which in turn, may lead to improved intervention strategies for individuals trying to quit smoking.

2. Methods

The present study is a secondary analysis of a smoking cessation intervention that evaluated the effectiveness of offering financial incentives for short-term abstinence among economically disadvantaged adults (Kendzor et al., 2015). Briefly, 146 adults interested in quitting smoking, were recruited from a tobacco cessation clinic, which primarily served low-income and uninsured African American adults, at the Dallas County safety-net hospital from 2011 to 2013. To provide context for the study, according to census information from 2018[1], Dallas County, Texas, is a large and diverse metropolitan city with a population of 2,368,139 people, of which, 23.4% of residents are African American and 40.2% are Hispanic or Latino. Median household income in Dallas County is $53,626, and 14.8% of people live in poverty. Notably, almost one-fourth of the population in Dallas County is foreign-born, and 42.6% of households speak a language other than English.

Participants recruited from the tobacco cessation clinic were randomly assigned to receive either pharmacotherapy and counseling sessions (e.g., usual care) or usual care with small financial incentives for smoking abstinence (i.e., contingency management; Kendzor et al., 2015). They provided their sociodemographic information and completed a measure of perceived discrimination one week before the quit date. Participants completed a measure of self-efficacy on the first day after their scheduled quit attempt (i.e., participants were instructed to quit by 10 p.m. the evening prior). Smoking abstinence, which was self-reported and verified biochemically, was assessed one day after the quit attempt, and weekly, through the fourth week after the quit date. Complete smoking status data were available for 98% of participants at quit date; 100% at Week 1, 90% at Week 2, 72% at Week 3, and 86% at Week 4.

2.1. Measures

2.1.1. Independent variable

Perceived discrimination was measured using the Everyday Discrimination Scale (EDS), which is a widely used nine-item self-report measure that assesses minor but chronic or episodic events of discrimination or maltreatment (Williams et al., 1997). The EDS includes items that measure daily experiences with unfair treatment, such as being treated with less respect or with less courtesy. Participants were also asked, "What was the main reason for the discrimination you experienced?", and were given the following responses: (1) *your age*, (2) *your gender*, (3) *your race*, (4) *your ethnicity or nationality*, (5) *your religion*, (6) *your height or weight*, (7) *some other aspect of your appearance*, (8) a *physical disability*, (9) *your sexual orientation*, and (10) *other reasons*. Scores on the EDS range from 9 to 54; higher scores indicate high levels of perceived discrimination. Studies have shown that EDS has high internal consistency (Bastos et al., 2010), and it was also high in our sample (α = .91). Last, the EDS has a single factor structure (Gonzales et al., 2016; Kim et al., 2014), and is generally perceived equivalently across different racial and ethnic groups (Kim et al., 2014).

2.1.2. Dependent variable

Expired carbon monoxide (CO) levels were used to verify cigarette smoking status. CO levels of ≥8–10 parts per million (ppm) detect cigarette smoking with 90% sensitivity and specificity (Benowitz et al., 2002). We defined abstinence on the first day after quitting as self-reported smoking abstinence since 10 p.m. the prior evening and having an expired CO level of ≤ 10 ppm. This threshold for smoking abstinence was selected because of the recency of quitting (≥ 12 h prior). Point prevalence abstinence for each week following the quit date was defined as self-reported abstinence from smoking over the past seven days and expired CO level of < 8 ppm. Participants who met abstinence criteria were coded as abstinent (abstinent = 0), and participants who did not meet these criteria were coded as smoking (smoking = 1).

2.1.3. Mediator variable

Perceived self-efficacy for smoking cessation was measured using the Self-Efficacy Scale/Confidence (SESC), which is a 9-item scale that reflects an individual's belief in their ability to cope with high-risk situations without smoking (Velicer et al., 1990). The SESC includes items that measure an individual's confidence that they will not smoke during certain situations or scenarios, such as when they are with their friends at a party or when they first get up in the morning. Total scores on the SESC range from 9 to 45; higher scores indicate more confidence in their ability to cope with high-risk situations without smoking. The SESC has three first-order factors (Positive/Social Situations, Negative/Affective Situations, and Habit/Addictive Situations), and one-second order factor (Confidence/Self-Efficacy; Velicer et al., 1990), and had high internal consistency in the current sample (α = .94).

2.1.4. Covariates

Covariates in the analysis were selected *a priori* based on their known relationships with tobacco cessation, and included baseline (pre-quit) assessments of race/ethnicity (non-Hispanic White vs. Hispanic and non-White), sex (female vs. male), age, treatment group (UC vs. CM), years of education, and nicotine dependence (i.e., the heaviness of

[1] https://www.census.gov/quickfacts/fact/table/dallascountytexas/PST045218.

smoking index).

2.2. Statistical analyses

Correlations were computed for independent and dependent variables, and these analyses were conducted using SAS 9.4 (SAS, 2013). The primary analyses were completed using structural equation modeling in Mplus 7.4 (Muthén and Muthén, 2010). Perceived discrimination and self-efficacy were treated as latent variables and were approximated using all items from the EDS and the three sub-scale total scores from the SESC, respectively. Latent variables were scaled by constraining the factor loading of one item from each scale to 1. Dichotomous smoking status variables at weeks 1–4 were included as non-latent dependent variables. All parameters presented were unstandardized, unless otherwise specified, and were estimated using weighted least squares means and variance adjustment (WLSMV) to account for the mixture of continuous and categorical endogenous variables, missing data (i.e., missing smoking status data on Weeks 1–4 and minor violations of normality). Indirect effects were tested using the "Model Indirect" command.

The first step in our analysis involved constructing a measurement model that determined how well the hypothesized factor structure of EDS and SESC fit the sample. At this time, covariances were specified between discrimination and self-efficacy, smoking abstinence and self-efficacy, smoking abstinence and discrimination, and covariances were also specified to account for the relations between previous and current smoking abstinence for all time points. The next step involved estimating paths for discrimination on self-efficacy and discrimination and self-efficacy on smoking cessation at Weeks 1–4. During this step, we determined whether to retain or drop the direct path from discrimination to smoking abstinence. The final step involved introducing covariates into the model to improve model estimation and obtain partial estimates. During this step, covariances were specified to account for the relations between quit-day abstinence and self-efficacy and quit-day abstinence and smoking abstinence at all other time points; this was done, *a-priori*, to control for the bias that is introduced when smoking behavior and self-efficacy are measured at the same assessment (i.e., those who are smoking have lower self-efficacy for quitting; Gwaltney et al., 2009).

All models were evaluated for model fit according to the (1) model chi-square, (2) root mean square error of approximation (RMSEA), (3) Bentler comparative fit index (CFI), and (4) weighted root mean square residual (SRMR), and the published rules for interpreting fit indices were strictly adhered to (Hooper et al., 2008). Post-hoc modifications to any model were done if it was theoretically justifiable and noticeably increased model fit, as indicated by scores on modification indices.

3. Results

3.1. Sample characteristics

As shown in Table 1, the mean age of participants was 51.7 years (SD = 7.1), and most participants were female (58.9%) and/or Hispanic or non-White (71.9%). Note that most non-White participants were African American (85.7% of non-White participants). According to scores on the HSI, participants were moderately addicted to nicotine at the baseline pre-quit visit (M = 3.3, SD = 1.3). On the day after the scheduled quit day, only 27.4% of individuals were smoking, and participants were, on average, moderately confident (M = 3.4, SD = 0.9) that they would be able to quit smoking successfully. However, among those who had valid smoking status data, one week after the scheduled quit-day (n = 143), 61.6% of participants had smoked during the previous 7 days, which slightly increased at Week 2 (n = 146; 64.9%), and declined at Weeks 3 (n = 105; 58.1%) and Week 4 (n = 126; 56.4%).

Table 1
Sample characteristics (N = 146).

	Mean (SD) or N (%)
Age (years)	51.7 (SD = 7.1)
Females	86 (58.9%)
Non-White[a]	105 (71.9%)
Education (years)	12.0 (SD = 2.0)
Heaviness of smoking index	3.3 (SD = 1.3)
Treatment group	
Usual care	71 (48.6%)
Contigency management	75 (51.4%)

[a] Whites (n = 41); African Americans (n = 91); Hispanics (n = 8); American Indian/Alaska Natives (n = 1); and more than one race (n = 5).

3.2. Everyday discrimination experiences

The most frequently reported everyday discrimination experiences that occurred more than a few times a month included: people acting as if they were better than you (30.1%), being treated with less courtesy than other people (25.3%), and being treated with less respect than other people (24.7%). African Americans and other racial and ethnic groups, across all everyday discrimination experiences, reported discrimination at a greater frequency than Whites (see Table 2). Among those who provided a reason for discrimination (n = 117), almost one-fourth (24.8%) reported their race as the main reason. Other reasons for everyday discrimination included other aspects of appearance (17.1%), other unspecified reasons (16.2%), physical limitations (11.1%), age (7.7%), ethnicity or nationality (6%), height or weight (6%), gender (5.1%), sexual orientation (3.4%), and religion (2.6%). The top three provided reasons for discrimination among African Americans were race (34.2%), other aspects of their appearance (14.5%), and other unspecified reasons (13.2%), and among Whites, aspects of their appearance (31.0%), religion (17.2%), and other unspecified reasons (17.2%).

3.3. Structural analyses

Intercorrelations of independent, mediator and dependent variables can be found in Table 3. The two-factor structure for the measurement model adequately fit the data according to many fit indices: chi-square test of model fit (DF = 93, χ^2 = 118.82, p = .04), RMSEA (ε = 0.04 [90% CI = 0.01, 0.07]), CFI (0.97), and SRMR (0.06). The indicators for each latent construct had very strong loadings, and the cross-loadings of items between perceived discrimination and self-efficacy were negligible. No post-hoc modifications to the model were required. Given the robustness of the measurement model, we estimated parameters for self-efficacy on discrimination and smoking abstinence at Weeks 1–4 on discrimination and self-efficacy without controlling for covariates. A greater frequency of perceived discrimination at baseline predicted lower perceived self-efficacy on the day after the scheduled quit attempt (B = −.15 SE = .07, p = .02), and lower perceived self-efficacy predicted an increase in the probability of smoking at Weeks 1 (B = −.42 SE = 0.11, p < .01), 2 (B = −.34 SE = 0.13, p = .02), and 4 (B = -.32 SE = .12, p = .01). Importantly, discrimination frequency was not directly associated with smoking abstinence at any week (all p-values ≥ .15); therefore, the path from discrimination to smoking abstinence was omitted from the model that controlled for covariates. Omitting the paths from discrimination to smoking abstinence did not significantly alter the structural model (DF = 4, χ^2 = 4.85, p = .30). Notably, specifying a path from discrimination to smoking abstinence is not required to establish evidence of mediation (Hayes and Rockwood, 2017).

The final structural model, which controlled for covariates, performed well on all fit indices, except the SRMR: chi-square test of model fit (DF = 186, χ^2 = 213.39, p = .08), RMSEA (ε = 0.03 [90%

Table 2
Percent of participants who endorsed everyday discrimination at a frequency of ≥ a few times per month among socioeconomically disadvantaged smokers.

Variable	N (%)			
	Total (N = 146)*	Whites (n = 41)	Blacks (n = 91)	Other Minorities (n = 14)
Treated with less courtesy than other people (EDS, 1)	37 (25.3%)	7 (17.1%)	26 (28.6%)	4 (28.6%)
Treated with less respect than other people (EDS, 2)	36 (24.7%)	6 (14.6%)	26 (28.6%)	4 (28.6%)
Receive poorer services than other people at restaurants or stores (EDS, 3)	20 (13.7%)	3 (7.3%)	14 (15.4%)	3 (21.4%)
People act as if they think you are not smart (EDS, 4)	29 (19.9%)	5 (12.2%)	20 (22.0%)	4 (28.6%)
People act as if they are afraid of you (EDS, 5)	23 (15.8%)	6 (14.6%)	14 (15.4%)	3 (21.4%)
People act as if they think you are dishonest (EDS, 6)	19 (13.0%)	3 (7.3)	14 (15.4%)	2 (14.3%)
People act as if they are better than you (EDS, 7)	44 (30.1%)	9 (22.0%)	41 (34.1%)	4 (28.6%)
Called names or insulted (EDS, 8)	16 (11.0%)	2 (4.9%)	11 (12.1%)	3 (21.4%)
Threatened or harassed (EDS, 9)	9 (6.2%)	0	7 (7.70%)	2 (14.3%)

Table 3
Inter-correlations of independent, mediator, and dependent variables.

Variable	(1)	(2)	(3)	(4)	(5)	(6)
Week 1 smoking (1)	–	–	–	–	–	–
Week 2 smoking (2)	.56*	–	–	–	–	–
Week 3 smoking (3)	.47*	.55*	–	–	–	–
Week 4 smoking (4)	.51*	.59*	.81*	–	–	–
Self-efficacy/confidence scale total score (5)	−.31*	−.23*	−.17	−.25*	–	–
Everyday discrimination scale total score (6)	.13	.03	.16	.16	−.19*	–

***Note*:** Participants who met abstinence criteria were coded as abstinent (abstinent = 0) and participants who did not meet these criteria were coded as smoking (smoking = 1).
* $p \leq .05$.

CI = 0.00, 0.05]), CFI (0.96), and SRMR (0.26). As shown in Fig. 1, greater perceived discrimination at baseline predicted lower self-efficacy one day after the scheduled quit day (B = −.17 SE = .06, p = .01). After holding other variables in the model constant (i.e., sex, age, race, treatment group, education, and HSI), lower self-efficacy predicted a higher probability of smoking at post-quit weeks 1 (B = −.54 SE = 0.13, p < .01), 2 (B = −.33 SE = 0.14, p = .02) and 4 (B = -.43 SE = .14, p < .01). Perceived discrimination indirectly increased the probability of smoking at Week 1 (B = .09 SE = .04, p = .02) and 4 (B = .07 SE = .03, p = .03) through diminished self-efficacy (see Table 4 for additional details**)**. The indirect effect of perceived discrimination frequency on the likelihood of smoking via self-efficacy approached significance at post-quit week 2 (p = .08), but was not significant at post-quit week 3 (p = .14).

Two sensitivity analyses were conducted to see if the findings were influenced by missing data for smoking cessation. The hypothesized models were tested with missing values for smoking cessation imputed using penalized imputation (PI; e.g., missing data for smoking status is treated as smoking) and multiple imputation (MI) procedures. The direct and indirect effects were robust across analyses, but the magnitude of the direct and indirect effects were stronger using MI, and slightly weaker, but still significant, using PI. Closer inspection of the data showed that participants with missing data for smoking status had self-efficacy scores like participants who were abstinent, which downwardly

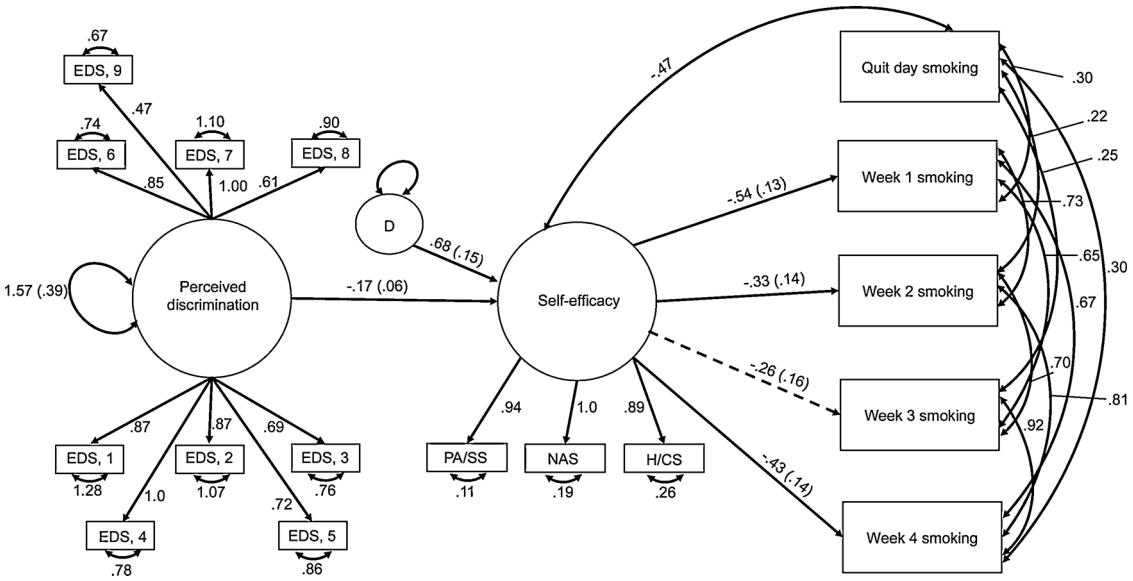

Fig. 1. A structural equation model depicting the effect of discrimination on smoking status after the scheduled quit date through self-efficacy.
Note: Perceived discrimination was measured at baseline, and self-efficacy for smoking cessation was measured one day after the scheduled quit day. Regressions of smoking abstinence at Weeks 1–4 on self-efficacy controlled for treatment group, race, education, gender, age, and nicotine dependence. The parameters, including factor loadings, are unstandardized and weighted least square mean and variance adjusted. Covariances are presented as correlations. Solid lines indicate a significant path.
** Tabular form of this illustration can be found in Table 4.
Legend: EDS = Everyday Discrimination Scale, SESC = Self-Efficacy/Confidence Scale, PA/SS = Positive Affect and Social Situations, NAS = Negative Affect Situations, and H/CS = Habitual and Cravings Situations.

Table 4
Weighted least squares means and variance adjusted estimates for a recursive model of perceived discrimination and self-efficacy and smoking abstinence ($N = 146$).

Parameter	Unstandardized	SE	*p*
Summary of Effects			
Perceived discrimination → Perceived self-efficacy	−.17	.06	.01
Perceived self-efficacy → Week 1 smoking	−.54	.13	< .01
Perceived self-efficacy → Week 2 smoking	−.33	.14	.02
Perceived self-efficacy → Week 3 smoking	−.26	.16	.11
Perceived self-efficacy → Week 4 smoking	−.43	.14	< .01
Indirect Effects			
Perceived discrimination → Perceived self-efficacy (-)→ Week 1 smoking (+)	.09	.04	.02
Perceived discrimination → Perceived self-efficacy (-)→ Week 2 smoking (+)	.06	.03	.08
Perceived discrimination → Perceived self-efficacy (-)→ Week 3 smoking (+)	.04	.03	.14
Perceived discrimination → Perceived self-efficacy (-) → Week 4 smoking (+)	.07	.03	.03

***Note*:** Perceived discrimination was measured at baseline, and self-efficacy for smoking cessation was measured one day after the scheduled quit day. Regressions of smoking abstinence at Weeks 1–4 on self-efficacy controlled for treatment group, race, education, gender, age, and nicotine dependence (data not shown). For indirect effects, the direction of the association is indicated in parentheses following each pathway (i.e., + or −).

biased the results observed when using PI. These data are available upon request.

4. Discussion

This study explored the effect of discrimination on smoking cessation during the first four weeks after a scheduled quit attempt. It was hypothesized that greater discrimination frequency would be directly associated with lower self-efficacy for quitting and a greater likelihood of smoking, and discrimination would also indirectly influence the likelihood of smoking via diminished self-efficacy. These hypotheses were partially supported; although discrimination did not have a direct effect on smoking cessation at any week, it indirectly affected smoking cessation through self-efficacy on some weeks. Findings suggest that discrimination lowers self-efficacy, and lower self-efficacy increases the probability of smoking during the first and fourth week after a quit attempt.

Even after adjusting for abstinence one day after the scheduled quit day, self-efficacy for smoking cessation directly predicted smoking abstinence at all-time points, except three weeks after the scheduled quit date. Previous studies have also shown that self-efficacy is a modest and consistent predictor of short and long-term smoking cessation outcomes (Gwaltney et al., 2009; Pinsker et al., 2018). Overall, people with low self-efficacy have trouble remaining abstinent after a quit attempt, and because this study measured self-efficacy shortly after the quit attempt, low self-efficacy seems to be an important indicator for identifying which individuals are the most at risk for smoking early on after making a quit attempt.

Though not consistently observed every week after the scheduled quit attempt, overall findings indicated that experiencing discrimination lowered individuals' confidence to resist smoking during high-risk situations. Individuals gain self-efficacy by successfully navigating difficult problems or situations when they arise (Bandura, 1982), but discrimination may promote feelings of helplessness and powerlessness that are at odds with one's sense of agency (Richardson et al., 2014). Also, individuals may internalize negative stereotypes and beliefs about their group, which may further distort their confidence in their capabilities (Cadaret et al., 2017; Chung et al., 2010). Unfair treatment in daily life may reduce confidence, therefore undermining an individuals' ability to navigate temptation situations during a quit attempt successfully. Relatedly, because self-efficacy is often measured situationally in smoking cessation research (Gwaltney et al., 2009), and because smoking is frequently used as a coping mechanism for individuals who experience psychosocial stress (Slopen et al., 2013, 2012), lower self-efficacy among smokers who experience discrimination may reflect their reliance on smoking tobacco to cope with discrimination-related psychological and physical distress (e.g., upset stomach or headache; Parker et al., 2017; Purnell et al., 2012). Overall, self-efficacy, especially when it is measured as the ability to maintain positive health behaviors under high-risk situations (Richardson et al., 2014), seems to be a plausible mechanism that helps to explain why individuals who experience discrimination have difficulty making positive health behavior changes.

Similar to findings from a national representative sample of adults (Boutwell et al., 2017), most participants reported experiencing discrimination that was unrelated to their racial and ethnic background. Besides race, the top 3 perceived reasons for discrimination were other aspect of appearance (17.1%), other unspecified reasons (16.2%), and physical limitations (11.1%). Irrespective of the reason for discrimination, interventions have been developed to directly address how people respond to discrimination by training individuals to reflect upon and write down their values and principles, which affirms the individual's self-image as good (i.e., value affirmation; Cook et al., 2012), and by teaching people to offer compassion and mercy toward the offender (i.e., forgiveness training; Baskin and Enright, 2004). People may situationally smoke to cope or avoid the unpleasant emotions and sensations caused by discrimination, and therefore teaching people to embrace their values and principles (Cook et al., 2012), encouraging compassion and mercy toward the offender (Baskin and Enright, 2004), and staying mindful of negative feelings and sensations caused by discrimination instead may improve cessation outcomes (Brewer et al., 2011; Heppner et al., 2016; Vidrine et al., 2016). Alternatively, discrimination might also be addressed by reducing income inequalities (Williams and Collins, 1995). Research has shown that conditional cash transfer programs, which are programs that offer low-income individuals or families cash for activities that generate long-term benefits, do not increase consumption of tobacco and alcohol (Evans and Popova, 2017), and modestly improve financial well-being, optimism, and overall health (Courtin et al., 2018), all of which may indirectly prevent relapse and smoking altogether.

This study has some limitations. First, missing data for smoking cessation at certain follow-up points influenced the effect estimates for the association between self-efficacy and smoking cessation outcomes (e.g., 28% of participants had incomplete smoking status data at 3 weeks post-quit). Though the associations were robust across analyses, the magnitude of the direct and indirect effects varied according to the strategy used to handle missing data for smoking status (i.e., FIML, MI, or PI). Additionally, the sample size was also relatively small. Therefore, missing data for smoking status on Weeks 2 and 3 and a relatively small sample size may have prevented us from detecting a direct effect of self-efficacy on smoking cessation on Week 3, and an indirect effect of discrimination on smoking cessation on Weeks 2 and 3. Findings should be replicated within a larger sample, and higher rates of complete data smoking status would generate more precise findings.

Second, this study cannot definitively conclude that discrimination and self-efficacy are causally linked. Future innovative experimental research that attempts to intervene on or manipulate discrimination events should also see if discrimination causally impacts self-efficacy. Third, major discrimination events were not assessed. A previous study showed that the occurrence of potentially life-altering major discrimination events reduced the likelihood of successful smoking cessation among Latinos of Mexican heritage (Kendzor et al., 2014a). Fourth, both discrimination and self-efficacy were assessed using self-report questionnaires, and some participants may have minimized or

exaggerated their experiences of discrimination or their self-efficacy. African Americans living below the poverty threshold tend to report fewer instances of discrimination than higher income African Americans for reasons that are not well understood (Colen et al., 2018), and some individuals have difficulty judging their ability to quit smoking (Gwaltney et al., 2009). Last, this study focused on short-term abstinence. Future studies should examine prolonged abstinence to determine if people who experience discrimination have trouble remaining abstinent long-term because of the lack of self-efficacy.

Despite the limitations, this was the first study to identify self-efficacy as a mechanism through which discrimination affects smoking cessation outcomes. Notably, this association was demonstrated in a sample of socioeconomically disadvantaged adults, which is a population of considerable interest because of disproportionately high rates of tobacco use (Hiscock et al., 2012; Jamal et al., 2018). Future research should explore the impact of everyday and major discrimination on smoking cessation and other health outcomes in larger samples that include significant numbers of individuals from a variety of minority backgrounds. Also, future research should also focus on identifying moderators, such as coping styles and social support, which may buffer against the adverse effects of discrimination on self-efficacy. Addressing discrimination within smoking cessation interventions has the potential to improve cessation outcomes within socioeconomically disadvantaged populations that are known to have difficulty quitting.

Role of funding source

This work was supported by institutional funding provided by the University Of Texas School Of Public Health (to DEK and MSB) and American Cancer Society grants MRSG-10-104-01-CPHPS (to DEK) and MRSG-12-114-01-CPPB (MSB).This work was partially supported by the University of Oklahoma Health Sciences Center, Oklahoma Tobacco Settlement Endowment Trust (TSET) grant 092-016-0002.

Contributors

DK and MB designed the parent study. AA formulated the research questions and hypotheses and conducted the secondary data analyses for this study. AA also prepared the 1st draft of the manuscript. All authors revised the 1st draft and approved the final manuscript.

Conflict of interest

No conflict declared.

Acknowledgement

None.

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