Low self-esteem and positive beliefs about smoking: A destructive combination for male college students

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Abstract

Introduction—Men exhibit higher rates of smoking relative to women (CDC, 2014). Given the associated health and socio-economic consequences, it would be valuable to explore the psychological factors underlying this variance. We contend that positive beliefs about smoking influence this difference, and that self-esteem moderates these beliefs.

Method—As part of a multi-institutional collaborative study funded by the American Legacy Foundation, 445 participants who reported being either steady or occasional smokers completed a series of questionnaires assessing their beliefs and behaviors involving smoking as well as several dispositional variables. Moderated mediation was used to test for conditional indirect effects.

Results—The total, indirect, and direct effects of gender were significant for individuals with lower, but not higher self-esteem. Males with lower self-esteem exhibited more positive beliefs and smoking behavior than females with lower self-esteem. No differences between males and females with higher self-esteem were observed.

Conclusion—The gender gap in smoking behavior appears to occur primarily among individuals with lower self-esteem. It is a particularly detrimental risk factor for males, as it is related to higher positive views about smoking and increased tobacco consumption. These results highlight the importance of developing multifaceted gender specific belief-based preventative interventions to address smoking related behaviors.

Keywords

Gender; Self-esteem; Positive beliefs; Smoking; Moderated mediation

1. Introduction

Tobacco-related illnesses account for nearly half a million deaths annually in the U.S. according to the Centers for Disease Control (CDC, 2014). Cigarette usage is a growing

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concern, especially among young adults. As of 2012, 17.3% of young adults (ages 18–24) and 21.6% of adults aged 25–44 years reported being regular cigarette smokers (CDC, 2014), despite being well aware of the risks associated with smoking tobacco. Additionally, the Substance Abuse and Mental Health Services Administration (SAMHSA) found that nearly 41% of individuals aged 18 to 25 reported having used tobacco products (primarily cigarettes) in the past month (SAMHSA, 2011). The problem of cigarette use may be even more dire for males, as several studies have shown that males typically engage in higher levels of cigarette smoking relative to females (Blanco et al., 2014; CDC, 2014; Vidrine, Anderson, Pollak, & Wetter, 2006). The primary goal of the current study is to examine potential reasons for this difference, with the hope that doing so can identify malleable factors that will set the stage for the development of interventions and cessation programs that can be used to reduce smoking among males and thereby reduce this gender gap.

A constellation of individual and social factors have been identified as contributors to smoking behavior in adolescents and young adults including: personality factors such as neuroticism (Byrne, Byrne, & Reinhart, 1995), self-esteem (Abernathy, Massad, & Romano-Dwyer, 1995), and BAS/BIS sensitivity (Baumann et al., 2014), SES (Backinger et al., 2008; McClave-Regan & Berkowitz, 2011), the perception of normative peer smoking (Unger, Rohrbach, Howard-Pitney, Ritt-Olson, & Mouttapa, 2001), and positive or neutral parental attitudes toward smoking (Botvin, Epstein, Schinke, & Diaz, 1994). Clearly, cigarette use is a complex phenomenon that is influenced by a myriad of factors. To understand cigarette use, one must examine how determinants of cigarette use interact with each other and which effects are mediated by others. For this particular study, we focus on interactions between gender, self-esteem, and positive beliefs about smoking.

In addition to males being more likely than females to use cigarettes (Blanco et al., 2014; CDC, 2014; Vidrine et al., 2006), there is reason to believe that several variables predict smoking behavior differently for males versus females. For example, smoking behavior is thought to be influenced by the extent to which individuals subscribe to positive beliefs about smoking (e.g., Lewis-Esquerre, Rodrigue, & Kahler, 2005; Urbán & Demetrovics, 2010). However, some research suggests that the link may be stronger for males than it is for females (Flay, Phil, Hu, & Richardson, 1998). Such a difference would make positive beliefs a plausible mediator for the relationship between gender and cigarette use. The present study focused on this variable as a mediator of the relationship between gender and smoking given previous literature showing 1) that smokers of both genders are more likely than non-smokers to endorse beliefs that emphasize the positive and functional features of smoking (e.g., Dillard, McCaul, & Klein, 2006), and 2) that these beliefs are positively associated with smoking behavior (e.g., Lewis-Esquerre et al., 2005). Furthermore, given that positive beliefs about smoking can be manipulated (e.g., Davis, Nonnemaker, & Farrelly, 2007) and that such beliefs change systematically with changes in smoking status (Fotuhi et al., 2013), we feel that they hold immense potential as possible targets for interventions.

Another variable that may contribute to the gender gap in smoking behavior among young adults is self-esteem, which can be defined as an individual's global assessment of his or her value or worth (Rosenberg, 1965). Some studies have demonstrated a negative relationship

between self-esteem and smoking (e.g., Carvajal, Wiatrek, Evans, Knee, & Nash, 2000; Croghan et al., 2006), indicating that it may serve as a protective factor against smoking. Individuals with low self-esteem are more likely to be persuaded to smoke (Dumont & Provost, 1999), which may cause them to change their opinions about the positive aspects related to smoking (Fotuhi et al., 2013). Moreover, these changes in positive beliefs may be moderated by gender. However, the pattern of moderation is difficult to predict given that studies examining gender differences in the relationship between self-esteem and smoking behavior have yielded inconsistent results. Some studies suggest a stronger relationship between self-esteem and smoking for males (Patton, Barnes, & Murray, 1993) and others suggest the opposite (Lewis, Harrell, Bradley, & Deng, 2001). Such inconsistencies suggest that other factors may be playing a mediating or moderating role. Conditional process modeling, of which moderated mediation is an example, provides a framework for exploring and testing contingencies of process-related effects (Hayes, 2013). As such, it is a useful tool for resolving inconsistent findings such as those reported above.

To our knowledge, previous research has not examined how self-esteem interacts with gender and positive beliefs about cigarette smoking to affect smoking behavior within a single conditional process model. In an effort to fill this void and reconcile some of the inconsistent findings noted above, the present study aimed to 1) determine the degree to which positive beliefs about smoking mediate the relationship between gender and smoking, and 2) determine whether self-esteem moderates that effect. Based on the literature above, we made four specific predictions. First, we hypothesized that gender would be associated with positive beliefs about smoking and total cigarette usage, which would replicate findings from studies such as Flay et al. (1998) and Vidrine et al. (2006) respectively. Second, given findings linking increased smoking behavior to higher positive beliefs about smoking (e.g., Urbán & Demetrovics, 2010), we expected that positive beliefs about smoking would have a positive association with total cigarette usage. Based on the first two predictions, our third prediction was that positive beliefs about smoking would mediate the relationship between gender and total cigarette usage. Finally, given many of the aforementioned inconsistent findings relating gender, positive beliefs about smoking, self-esteem, and smoking behavior, we predicted that self-esteem would moderate the first stage (the relationship between gender and positive beliefs) of the model as well as the direct effect remaining after accounting for mediation. The entire hypothesized model is displayed in Fig. 1.

2. Method

2.1. Participants

As part of a multi-institutional study funded by the American Legacy Foundation (ALF), N = 445 participants who reported being either steady (83%) or occasional (17%) smokers were recruited from ethnically diverse educational institutions in California, Florida, New York, and Texas. Depending on the policies of each respective university, recruitment of participants was accomplished via email lists, flyers, and classroom announcements. Participation was incentivized with either with a $20 (U.S.) credit at Amazon.com or credit toward course research activity requirements. The aim of the broader effort was to compare smoking-related behaviors and attitudes across Hispanic subgroups (see American Legacy

Foundation, 2014), resulting in an oversampling of Hispanics (65%) relative to Whites (23%), African Americans (6%) and those of other or unidentified ethnicity (6%). Sixty-eight percent of the sample was male and the median age was 21 years (interquartile range = 19 to 24).

2.2. Measures

The entire study was conducted online. The survey required up to 50 min to complete. Questions included items pertaining to tobacco, alcohol, and drug usage, as well as numerous trait and attitudinal measures. The specific measures used for the current study are detailed below. Table 1 details the raw means and standard deviations for each variable, as well as the correlations between the variables and their respective reliabilities, where applicable.

2.2.1. Self-esteem—Participants completed Rosenberg's Self-esteem scale (Rosenberg, 1965), a ten-item measure assessing global self-esteem (e.g., "I feel that I have a number of good qualities."). Items were measured on a 4-point scale ranging from 1 (strongly disagree) to 4 (strongly agree). Coefficient alpha was .84, and the items were summed together to yield a total self-esteem score for each participant.

2.2.2. Positive beliefs about smoking—Participants answered thirteen items assessing various positive beliefs about smoking (e.g., "Smoking gives me more energy.") compiled from both specific measures (e.g., Smoking Consequences Questionnaire, Brandon & Baker, 1991) and common lists in the literature. Appendix A lists the items. All items were measured on a 5-point scale ranging from 1 (strongly disagree) to 5 (strongly agree). Coefficient alpha was .88. To provide empirical justification for the derivation of a total score on these items, we examined an exploratory bifactor model using the "Omega" package in the R open-source statistical analysis program. Bifactor models allow one to simultaneously examine the loadings of items on a general factor and potential specific factors (Reise, Moore, & Haviland, 2010). Results of this analysis indicated a strong general factor and two specific factors. Each of the thirteen items loaded more strongly on the general factor than on either of the two specific factors. In addition, the general factor exhibited high reliability (Coefficient ω_h = .73) and explained 73% of the common variance, which provides strong evidence for unidimensionality (Reise et al., 2010). Neither specific factor indicated acceptable reliability (Coefficient ω_s = .20 and .26) and, consequently, each lacked sufficient true score variance to be interpretable (Gignac & Watkins, 2013). Based on these results, the items were summed to create a single positive beliefs score for each participant.

2.2.3. Total cigarette usage—Two categorical items from the CDC's National Adult Tobacco Survey (2011), assessed the number of days out of the previous thirty that participants had smoked cigarettes as well as how many cigarettes they used, on average, on days they had smoked. Responses to these questions each covered a specific range (e.g., 2 to 5 days). Consistent with common practice for calculating means from categorical variables (Agresti, 1996), we calculated the midpoints of each response for each variable, and then multiplied participants' midpoint scores to obtain estimates of total cigarette usage over the

thirty days prior to their participation. The resulting mean was 116.79 and the standard deviation was 150.07. The resulting variable was positively skewed, as would be expected of a count variable, and thus was log-transformed to meet assumptions of subsequent analyses (Cohen, Cohen, West, & Aiken, 2009).

2.3. Data analytic plan

All analyses reported below were conducted using SPSS 19 (IBM Corp., 2010). Prior to any analyses and the forming of interaction terms, continuous variables serving as predictors were converted to Z-scores to ease interpretation of any significant effects. Next, a test of simple mediation was conducted, using bias-corrected bootstrapping to provide the strongest possible confidence interval for the examined indirect effect (Preacher & Hayes, 2008). Finally, the hypothesized moderation effects of self-esteem on different paths within the mediation model were evaluated using Version 2.13 of the PROCESS macro for SPSS (Hayes, 2013). Though the tests for moderation of the paths in the mediation model were conducted using continuous variables, as is the custom when reporting tests of moderated mediation (see Aiken & West, 1991), the simple effects are presented at ±1 standard deviation around the mean of the moderator (in our case, self-esteem) for the sake of explanation. Finally, given that our sample was largely Hispanic, we tested whether any of the effects discussed hereafter were qualified by ethnicity. We found no evidence of such moderation, and hence decided to treat all participants as a single group for all analyses.

3. Results

3.1. Tests of mediation

Results indicated that gender (F = 0, M = 1) was positively associated with positive beliefs about smoking ($b = .49$, $t = 4.97$, $p < .001$) but was not significantly associated with self-esteem ($b = -.01$, $t = -1.75$, $p > .05$). Positive beliefs about smoking significantly predicted the total number of cigarettes smoked when controlling for gender ($b = .26$, $t = 7.03$, $p < .001$). Both the total effect (gender predicting total cigarette usage) and the direct effects (gender predicting total cigarette usage when accounting for positive beliefs about smoking) of gender were positively associated with total cigarette usage ($b = . t = 4.47, 37, p < .001$, and $b = .25$, $t = 3.10$, $p = .002$, respectively). The indirect effect of gender through positive beliefs was also significant ($b = .13$, 95% CI: .07–.20). The ratio of the indirect effect to the total effect indicates that 35% of the relationship between gender and total cigarette usage is mediated by positive beliefs about smoking. Taken together, these results largely confirm the first three hypotheses.

3.2. Tests of moderated mediation

With respect to the fourth hypothesis, we predicted that self-esteem would moderate the first stage (the relationship of gender to positive beliefs) and direct effect (the relationship of gender to total cigarette usage) of the model. Evidence of moderation was found for both paths ($b = -.26$, $t = -2.86$, $p = .004$ and $b = -.16$, $t = -2.16$, $p = .03$, respectively). To examine the nature of this moderation, we computed simple slopes for each path at ±1 standard deviation around the mean of the moderator (self-esteem) as recommended by Aiken and West (1991). These results are displayed in Fig. 2. At the first stage, the

relationship between gender and positive beliefs about smoking decreased as self-esteem increased (-1 SD, $b = .72$, $t = 4.48$, $p < .01$; $+1$ SD, $b = .20$, $t = 1.54$, $p > .05$). The direct effect of gender on cigarettes smoked also decreased as self-esteem increased (-1 SD, $b = .42$, $t = 3.22$, $p < .01$; $+1$ SD, $b = .09$, $t = .88$, $p > .05$). Finally, as one would expect given the moderation of the first stage of the indirect effect and the moderation of the direct effect, both the overall indirect effect (-1 SD, $b = .15$, 95% CI: $.06$–$.29$; $+1$ SD, $b = .04$, 95% CI: $-.01$–$.12$) and total effects (-1 SD, $b = .57$, $t = 4.37$, $p < .01$; $+ 1$ SD, $b = .14$, $t = 1.18$, $p > .05$) of gender decreased as self-esteem increased. For those with lower self-esteem, the ratio of the indirect effect to the total effect indicates that 26% of the relationship between gender and total cigarette usage is mediated by positive beliefs about smoking. In the case of all of these effects, a clear pattern emerges indicating that high self-esteem appears to serve as a protective factor against smoking (both directly and indirectly), as none of the aforementioned effects are significant for individuals with higher levels of self-esteem.

Probing the interactions associated with the direct effect and first stage yielded different effects of self-esteem for the different genders with respect to the mediator and outcome variables (see Fig. 3). For the first stage interaction effect (left side of Fig. 3), it appears that for females, self-esteem did not relate to positive beliefs about smoking, as both groups were between .2 and .4 standard deviations below the mean. Males' positive beliefs about smoking, however, differed significantly depending on their level of self-esteem. Males with high self-esteem were .2 standard deviations below the mean (and thus, not much different from either group of females), while males with low self-esteem were about .5 standard deviations above the mean. The direct effect moderation (right side of Fig. 3) illustrates the interaction between gender and self-esteem in predicting total monthly cigarettes smoked, holding positive beliefs about smoking constant.[1] Again, women's cigarette usage did not vary as a function of self-esteem, and both were below the sample average of 116.79. Both groups of males were above the sample average, but for males, differences in self-esteem mattered. Males with lower self-esteem smoked 1.37 times as many cigarettes as those with higher self-esteem (almost 2.5 packs more monthly).

4. Discussion

The present study demonstrates the importance of examining interactive effects of individual differences when predicting smoking behavior. Gender is an important predictor of positive beliefs regarding smoking. However, the relationship of gender to positive beliefs regarding smoking varies with self-esteem. Indeed, simple slopes suggest that the relationship is significant at lower levels of self-esteem, but not at higher levels. In a similar vein, gender is an important predictor of monthly cigarette use, but simple slopes suggest that the direct effect of gender on monthly cigarette use is only significant when self-esteem is low. Indeed, of the relationships examined, only the relationship between positive beliefs regarding smoking and cigarette use was constant across genders and self-esteem levels.

[1]All statistical analyses reported above used the log transformed total monthly cigarettes variable. Results of the interaction effect are presented in the raw metric to ease interpretation.

In terms of potential applications, the results highlight two potentially useful variables to target for interventions: 1) positive beliefs regarding smoking, and 2) self-esteem. Previous research has found that males smoke more cigarettes than do females overall (Vidrine et al., 2006) and have stronger positive beliefs about smoking than do females (Flay et al., 1998). The current study replicates those findings. Previous research has also found that such beliefs are positively associated with higher levels of smoking (Lewis-Esquerre et al., 2005). We replicated this finding as well. Going beyond these previous studies, we also show that at least some of the gender difference in cigarette use can be accounted for through gender differences in positive beliefs about smoking. As such, our findings suggest that interventions aimed at reducing positive beliefs about smoking may be particularly effective for reducing cigarette use among males. Our findings also go beyond previous research by showing that many of these gender differences are moderated by self-esteem. The moderation of many of the observed effects by self-esteem is quite interesting. Low self-esteem seems to be a particularly detrimental risk factor for smoking behavior for males, as it increases their smoking behavior directly (as evidenced by the direct effect moderation results) and indirectly by increasing their outlook on the positivity of smoking (as evidenced by the first stage and indirect effect moderation results). Thus, our findings suggest that interventions aimed at increasing self-esteem among lower self-esteem males may be another particularly promising avenue for reducing cigarette use among males.

These results highlight the importance of targeted prevention and intervention strategies for increasing programmatic impact. Conceivably, gender-tailored interventions may not be equally effective at reducing smoking behavior if they fail to account for differences in self-esteem. In terms of getting "the most bang for your buck," targeting males with low self-esteem to either increase their feelings of non-contingent self-worth or reduce their positive beliefs about smoking may be an effective strategy in reducing the gender gap in smoking behavior. With respect to reducing college-aged males' positive beliefs about smoking, future research could be devoted to identifying which particular beliefs about smoking are driving the effects reported above as the current data did not isolate individual beliefs. It is possible that a small cluster of the beliefs sampled are responsible for the observed effects; identifying these beliefs could make intervention efforts that much more effective.

As with any data, it is important to consider the context of the study when interpreting our results and inferring how broadly they may apply. First, all data were self-reported, hence there is a possibility the data were influenced by socially desirable responding, including under-reporting of smoking behavior and over-reporting of self-esteem. Additionally, the participants were all college-aged students and the importance of self-esteem in moderating many of the effects may be magnified. Given that self-esteem tends to rise gradually over adulthood (Robins & Trzesniewski, 2005), the observed effects may not generalize to an older sample. Future research is needed not only with respect to prevention and intervention strategies, but also with respect to establishing the generalizability of these results and identifying other mediators and moderators of the relationship between gender and smoking behavior. Lastly, although our study included some occasional smokers, the current sample was largely comprised of people who smoked regularly (83%). Examining only the regular smokers led to the same inferences as examining the full sample. However, given the relatively small number of occasional smokers in our sample it was not possible to directly

test the extent to which the relationships that we found held for occasional smokers specifically. Therefore, we urge caution in the application of our findings to occasional smokers.

Limitations aside, the present findings help reconcile several inconsistencies that exist in the extant literature. The results reported go beyond the established literature and provide the impetus for potentially successful interventions as well as future research. As suggested earlier, to understand and prevent cigarette use, determining how the determinants of cigarette use interact with and mediate each other is paramount. This study is an example of how conditional process modeling can be used to reconcile disparate findings and answer important questions about the nature of contingent process-related effects.

Acknowledgments

References

Abernathy TJ, Massad L, Romano-Dwyer L. The relationship between smoking and self-esteem. Adolescence. 1995; 30(120):899–907. [PubMed: 8588525]

Agresti, A. An introduction to categorical data analysis. New York: John Wiley & Sons; 1996.

Aiken, L.; West, S. Multiple regression: Testing and interpreting interactions. Newbury Park, London: Sage; 1991.

American Legacy Foundation. A study of tobacco-related health disparities in Hispanic/Latino subpopulations. 2014. Retrieved from http://legacyforhealth.org/content/download/5729/72319/version/2/file/Latino_College_Health_Initative_2014.pdf

Backinger C, Fagan P, O'Connell M, Grana R, Lawrence D, Bishop J, et al. Use of other tobacco products among U.S. adult cigarette smokers: Prevalence, trends, and correlates. Addictive Behaviors. 2008; 33(3):472–489. [PubMed: 18053653]

Baumann, MR.; Gonzales, R.; Parks, IA.; Garza, RT.; Lopez, SG. Latino College Health Initiative: Tobacco Use and Attitudes Among Hispanic Students. Paper presented at NCTOH; 2012; 2012.

Baumann M, Oviatt D, Garza R, Gonzales-Banks A, Lopez S, Alexander-Delpech F, et al. Variation in BAS–BIS profiles across categories of cigarette use. Addictive Behaviors. 2014; 39(10):1477–1483. [PubMed: 24949948]

Blanco L, Garcia R, Pérez-Stable E, White M, Messer K, Pierce J, et al. National trends in smoking behaviors among Mexican, Puerto Rican, and Cuban men and women in the United States. American Journal of Public Health. 2014; 104(5):896–903. [PubMed: 24625159]

Botvin G, Epstein J, Schinke S, Diaz T. Predictors of cigarette smoking among inner-city minority youth. Journal of Developmental and Behavioral Pediatrics. 1994; 15(2):67–73. [PubMed: 8034769]

Brandon T, Baker T. The Smoking Consequences Questionnaire: The subjective expected utility of smoking in college students. Psychological Assessment: A Journal of Consulting and Clinical Psychology. 1991; 3:484–491.

Byrne D, Byrne A, Reinhart M. Personality, stress, and the decision to commence cigarette smoking in adolescence. Journal of Psychosomatic Research. 1995; 39(1):53–62. [PubMed: 7760303]

Carvajal S, Wiatrek D, Evans R, Knee C, Nash S. Psychosocial determinants of the onset and escalation of smoking: Cross-sectional and prospective findings in multiethnic middle school samples. Journal of Adolescent Health. 2000; 27(4):255–265. [PubMed: 11008088]

Centers for Disease Control and Prevention. 2009–2010 National Adult Tobacco Survey. Methodology Report. 2011 Unpublished Report.

Centers for Disease Control and Prevention. Adult cigarette smoking in the United States: Current estimates. 2014. Retrieved from http://www.cdc.gov/tobacco/data_statistics/fact_sheets/adult_data/cig_smoking/index.htm

Cohen, J.; Cohen, P.; West, S.; Aiken, L. Applied multiple regression/correlation analysis for the behavioral sciences. 3. New York, NY: Routledge; 2009.

Croghan I, Bronars C, Patten C, Schroeder D, Nirelli L, Thomas J, et al. Is smoking related to body image satisfaction, stress, and self-esteem in young adults? American Journal of Health Behavior. 2006; 30(3):322–333. [PubMed: 16712446]

Davis K, Nonnemaker J, Farrelly M. Association between national smoking prevention campaigns and perceived smoking prevalence among youth in the United States. Journal of Adolescent Health. 2007; 41(5):430–436. [PubMed: 17950162]

Dillard A, McCaul K, Klein W. Unrealistic optimism in smokers: Implications for smoking myth endorsement and self-protective motivation. Journal of Health Communication. 2006; 11:93–102. [PubMed: 16641076]

Dumont M, Provost M. Resilience in adolescents: Protective role of social support, coping strategies, self-esteem, and social activities on experience of stress and depression. Journal of Youth and Adolescence. 1999; 28(3):343–363.

Flay B, Phil D, Hu F, Richardson J. Psychosocial predictors of different stages of cigarette smoking among high school students. Preventive Medicine. 1998; 27(5):A9–A18. [PubMed: 9808813]

Fotuhi O, Fong G, Zanna M, Borland R, Yong H, Cummings K. Patterns of cognitive dissonance-reducing beliefs among smokers: A longitudinal analysis from the International Tobacco Control (ITC) Four Country Survey. Tobacco Control. 2013; 22(1):52–58. [PubMed: 22218426]

Gignac G, Watkins M. Bifactor modeling and the estimation of model-based reliability in the WAIS-IV. Multivariate Behavioral Research. 2013; 48:639–662.

Hayes, A. Introduction to mediation, moderation, and conditional process analysis. New York: The Guilford Press; 2013.

IBM Corp. IBM SPSS statistics for Windows, version 19.0. Released Armonk, NY: IBM Corp; 2010.

Lewis P, Harrell J, Bradley C, Deng S. Cigarette use in adolescents: The Cardiovascular Health in Children and Youth Study. Research in Nursing & Health. 2001; 24(1):27–37. [PubMed: 11260583]

Lewis-Esquerre J, Rodrigue J, Kahler C. Development and validation of an adolescent Smoking Consequences Questionnaire. Nicotine & Tobacco Research. 2005; 7(1):81–90. [PubMed: 15804680]

McClave-Regan A, Berkowitz J. Smokers who are also using smokeless tobacco products in the US: A national assessment of characteristics, behaviors and beliefs of 'dual users'. Tobacco Control. 2011; 20(3):239–242. [PubMed: 21172853]

Patton D, Barnes G, Murray R. Personality characteristics of smokers and ex-smokers. Personality and Individual Differences. 1993; 15(6):653–664.

Preacher K, Hayes A. Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. Behavior Research Methods. 2008; 40(3):879–891. [PubMed: 18697684]

Reise S, Moore T, Haviland M. Bifactor models and rotations: Exploring the extent to which multidimensional data yield univocal scale scores. Journal of Personality Assessment. 2010; 92:544–559. [PubMed: 20954056]

Robins R, Trzesniewski K. Self-esteem development across the lifespan. Current Directions in Psychological Science. 2005; 14(3):158–162.

Rosenberg, M. Society and the adolescent self-image. Princeton, NJ: Princeton University Press; 1965.

Substance Abuse and Mental Health Services Administration. Results from the 2010 National Survey on Drug Use and Health: Summary of national findings. NSDUH Series H-41, HHS Publication No. (SMA). Rockville, MD: Substance Abuse and Mental Health Services Administration; 2011. p. 11-4658.

Unger J, Rohrbach L, Howard-Pitney B, Ritt-Olson A, Mouttapa M. Peer influences and susceptibility to smoking among California adolescents. Substance Use & Misuse. 2001; 36(5):551–571. [PubMed: 11419487]

Urbán R, Demetrovics Z. Smoking outcome expectancies: A multiple indicator and multiple cause (MIMIC) model. Addictive Behaviors. 2010; 35(6):632–635. [PubMed: 20167433]

Vidrine J, Anderson C, Pollak K, Wetter D. Gender differences in adolescent smoking: Mediator and moderator effects of self-generated expected smoking outcomes. American Journal of Health Promotion. 2006; 20(6):383–387. [PubMed: 16871816]

Appendix A. Items measuring positive beliefs about smoking

1. Smoking helps people deal with problems.
2. Smoking helps one get respect from others.
3. Smoking makes one feel good.
4. Smoking helps one relax.
5. Smoking keeps one thin.
6. Smoking makes partying fun.
7. Smoking is good after a meal.
8. Smoking helps me forget problems.
9. Smoking makes me feel that I'm making my own decisions.
10. Smoking helps me study.
11. Smoking gives me more energy.
12. Smoking controls my appetite.
13. Smoking controls my weight.

HIGHLIGHTS

- Positive beliefs about smoking mediate the gender to cigarette usage relationship.

- Self-esteem moderates the first stage and direct effect of the mediational model.

- Males with low self-esteem contribute significantly to the gender gap in smoking.

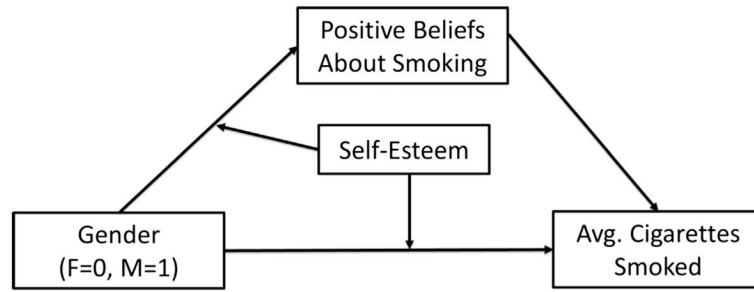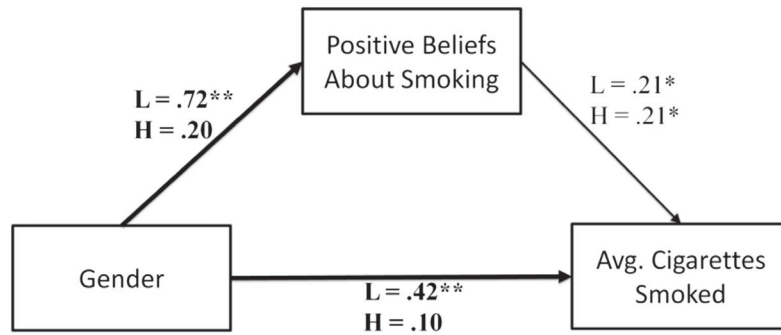- Self-esteem and positive beliefs represent malleable factors for interventions.

Fig. 1.
Hypothesized first stage and direct effect moderation model.

Fig. 2.
Mediational model for individuals with lower (L) versus higher (H) self-esteem. Bold paths and values are significantly different between different levels of self-esteem.*p* < .05, **p* < .01.
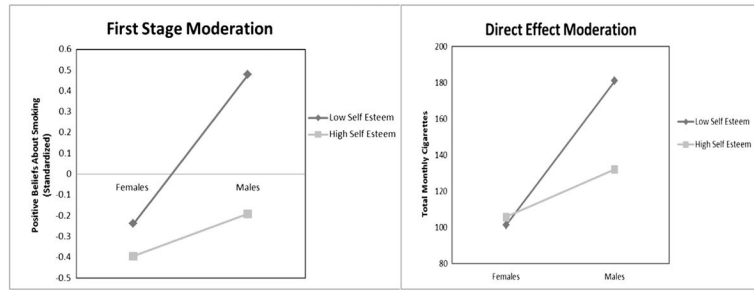
Fig. 3.
Moderation effects for the first stage and direct effect of the mediational model.

Table 1

Descriptive statistics for study variables.

	Mean (SD)	1	2	3	4
1. Gender (F = 0, M = 1)	.68	–			
2. Positive beliefs	41.12 (10.97)	.23**	(.88)		
3. Self-esteem	28.37 (6.80)	−.08	−.25**	(.84)	
4. Total cigarettes	116.79 (150.07)	.20**	.23**	−.14*	–

Note. N = 445. Values on the diagonal represent reliabilities for respective variables.

*
p < .01.

**
p < .001.