Published in final edited form as:

Addict Behav. 2009 April ; 34(4): 400–402. doi:10.1016/j.addbeh.2008.11.015.

Relationship Between Smoking Status and Body Weight in a Military Population of Young Adults

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Abstract

The purpose of the present study was to determine the association between smoking and body weight in a cohort of young U.S. Air Force recruits (mean age = 20 years) enrolled in basic military training ($N = 35\,986$). Twenty-two percent of recruits smoked daily prior to basic military training ($n = 8\,087$) and were compared to never smokers, former smokers, and experimental or nondaily smokers. A three-way interaction among smoking status, gender and ethnicity suggested a small effect for daily smoking among White male recruits only and no significant differences for female recruits or members of any other ethnic group. Although there was a statistically significant relationship between smoking and body weight in White males, the effect size was ~ 1 kg. These results suggest that the energy balance differences in body weight between young smokers and nonsmokers are minimal and that it would take decades to accrue the differences typically seen in adult smokers.

Keywords

smoking; body weight; young adults

1. Relationship Between Smoking Status and Body Weight in a Military Population of Young Adults

The negative health effects of cigarette smoking are well established (USDHHS, 2004) yet smoking among youth has ceased to decline over the past few years (CDC, 2006a). An estimated 24% of young adults in the United States continue to smoke (CDC, 2006b).

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Research has demonstrated the widespread belief that cigarette smoking has a weight controlling effect, and young people may begin smoking for this reason despite proven adverse health risks (Potter, Pederson, Chan, Aubut, & Koval, 2004 [review]). There is indeed evidence that a lifetime of smoking can attenuate weight gain commonly observed with advancing age (Pisinger & Jorgensen, 2007) and that smoking cessation may result in significant weight gain (Klesges, Meyers, Klesges, & La Vasque, 1989 [review]; USDHHS, 2000). However, other evidence suggests cigarette smoking has a negligible effect on body weight in younger people (Klesges, Ward, Ray, Cutter, Jacobs et al., 1998), lending support to the hypothesis that any observable weight differences take years, if not decades, to accrue. One study did find an association between smoking and reduced weight gain among adolescent girls (Stice & Martinez, 2005), but another prospective study found that smoking was related to increased weight gain in adolescents (Cooper, Klesges, Robinson, & Zbikowski, 2003). Furthermore, a study of more than 30,000 young Air Force recruits ($M = 19.8$ years) found a very small weight difference between male smokers and nonsmokers (~ 1 kg) and no weight difference at all for female recruits (Klesges, Zbikowski, Lando, Haddock, Talcott et al., 1998). These results further support that smoking in younger populations is negligibly associated with body weight.

Thus, the extant literature suggests a) adolescents widely perceive that smoking controls body weight, and b) this perception predicts smoking onset. Research into actual weight differences between young adult smokers and nonsmokers is scarce, yet learning the precise relationship between smoking and body weight change is important for future intervention efforts among young people. Therefore, the current study examined smoking and body weight in what we believe to be the largest population ($> 35\,000$) of young adults to date.

2. Method

2.1 Procedures

A baseline survey administered to 36 013 Air Force recruits enrolled in basic military training (BMT) between 1999 and 2000 included questions that covered demographics and tobacco use. Recruits self-reported height, body weight, gender, ethnicity, age, education and annual income. Tobacco use is prohibited in BMT, so smoking status was determined retrospectively according to self-reported history immediately prior to BMT and categorized as never smoker, experimental or nondaily smoker (smoked occasionally but not every day), former smoker (smoked regularly but quit prior to BMT), and daily smoker.

2.2 Statistical Analysis

Analysis of covariance was performed with the GLM univariate procedure in SPSS (15.0.1) to compare body weight (kg) in relation to smoking status, gender and ethnicity with height and age as covariates. Education and income were tested as covariates and did not affect the pattern of results. Main effects, two-way interactions, and a three-way interaction among smoking status, gender, and ethnicity were examined. Simple main effects tests with Bonferroni adjustments for multiple comparisons were used to examine significant interactions.

3. Results

Mean age was 20.1 years ($SD = 2.3$) and ranged from 17 – 35 years. Most recruits were single (88%; $n = 31\,745$) and male (74%; $n = 26\,739$). Ethnic minorities made up 36% of the sample. Self-reported body weight averaged 69.7 kg ($SD = 11.9$) and ranged from 36 to 133 kg. Eighty percent of daily smokers reported they had begun smoking regularly before they reached 18 years of age ($M = 15.6$, $SD = 2.3$).

As expected, males weighed more than females, $F(1, 35\ 952) = 817.72, p < .01$. The three-way interaction (smoking status, gender, ethnicity) was significant, $F(24, 35\ 952) = 2.06, p < .01$. As shown in Figure 1 (a and b), daily smokers weighed significantly less than nonsmokers among White male recruits only ($MD = 1.0\text{ kg}, p < .01$). No significant differences were found for female recruits, regardless of ethnicity. Analyses were also conducted with BMI and the pattern of results was not affected.

4. Discussion

This investigation examined the association between body weight and smoking in a large, ethnically diverse population of young Air Force recruits. Results corroborate previous findings that show minimal-to-no association between smoking and reduced body weight in young people (Klesges, Elliott, & Robinson, 1997; Klesges, Zbikowski et al., 1998). Although a difference was found between White male smokers and nonsmokers, the effect was quite small (~1 kg). Of critical importance is that female daily smokers, who most often cite weight control as a reason for smoking (Camp, Klesges, & Relyea, 1993; Klesges & Klesges, 1988), showed no weight benefit.

Despite the strengths of this study (e.g., large diverse sample), several limitations should be noted. One potential drawback is self-reported height and weight although such self-reports are generally viewed as acceptable in large-scale studies (Spencer, Appleby, Davey, & Key, 2007; Tienboon, Wahlqvist, & Rutishauser, 1992). A second limitation is self-reported smoking status although past research suggests that self-reported smoking is highly accurate in healthy populations with limited incentive or social pressure to misreport (Velicer, Prochaska, Rossi, & Snow, 1992). A third consideration is generalizability beyond military personnel. Young adults who join the armed forces differ inherently from civilians (e.g., younger, more likely to be minority and low-income) and are a fairly select group in that eligibility for service requires they be in good physical health and not obese. However, similar results have been reported for adolescent and young adult civilians (Klesges et al., 1997; Klesges, Ward et al., 1998).

Consistent with a growing literature, these findings indicate little, if any, benefit of smoking to manage body weight among young adults. As noted by the Surgeon General (USDHHS, 1990), several studies have shown that any relationship between smoking and reduced body weight appears to be moderated by age, and later studies have shown little or no weight attenuation in young smokers (Klesges et al., 1997; Klesges, Zbikowski et al., 1998). Any effect on body weight most likely would emerge in middle age and probably would be a suppression of weight gain rather than weight loss. Given the common belief that smoking can promote thinness, prevention strategies among young people should focus on correcting this misperception. Future research should determine whether there is a particular age at which differences in body weight begin to emerge between smokers and nonsmokers, whether the actual duration of smoking is more important, or whether an interaction between age and duration of smoking is most informative.

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Acknowledgments

This work was supported by research grant HL053478 from the National Heart, Lung, and Blood Institute (R.C. Klesges, Principal Investigator). Expressed views are those of the authors and do not represent the official position of the United States Air Force Basic Military Training, the Department of Defense, the Department of Veterans Affairs, or the United States Government. The authors thank the staff of Wilford Hall Medical Center and the San Antonio Military Medical Center (SAMMC) for their assistance in completing this project.

Figure 1.

(a) Estimated marginal means of weight (kg) in male recruits

(b) Estimated marginal means of weight (kg) in female recruits