Cigarette Smoking and Perceived Health in School Dropouts: A Comparison of Mexican American and Non-Hispanic White Adolescents

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Objective: To examine the relations between educational attainment and health (cigarette smoking and perceived health) in Hispanic adolescents.

Method: Participants included 3,360 Mexican American and non-Hispanic white adolescents ranging in age from 12 to 21 years. The sample included school dropouts, academically at-risk students, and control students.

Results: School dropouts were 6.46 times more likely and academically at-risk students were 2.80 times more likely to smoke heavily than were control students. In addition, school dropouts reported poorer health than did their peers. Results suggest that the relation between educational attainment and perceived health is mediated by cigarette smoking.

Conclusions: Increased awareness of educational attainment as a significant risk factor for smoking in Hispanic adolescents will enable smoking cessation services to be targeted more effectively.

Key words: cigarette smoking; school dropout; Hispanic.

Educational attainment is widely regarded as an important health risk factor because it is “strongly associated with health outcomes, health-related behaviors, and other risk factors” (National Center for Health Statistics, 1999, p. 31). Specifically, adults with lower levels of educational attainment typically experience poorer health and higher mortality levels (Marmot & Feeney, 1997). In addition, adults who have not completed high school evidence higher levels of cigarette smoking (e.g., Novotny, Warner, Kendrick, & Remington, 1988). Although the link between educational attainment and health has been studied extensively with adults, little research has focused on adolescents, especially adolescents of Hispanic origin. Hispanic origin is a potentially important consideration in studies of educational attainment because Hispanics are dramatically overrepresented among school dropouts in the United States. Although Hispanics constitute only 12% of the U.S. population, they account for 25% of the school dropouts (Census Bureau, 1999). Consequently, the focus of this study was on the relation between educational attainment and health in Hispanic adolescents.

To examine Hispanic adolescents’ educational attainment and health, we assessed cigarette smoking and perceived relative health (i.e., perceived health relative to one’s peers) in a large sample of Mexican American (MA) and non-Hispanic white (nHw) adolescents. Mexican Americans are the largest Hispanic...
subgroup in the United States (Census Bureau, 1999). Moreover, they have the highest dropout rates of Hispanic subgroups (National Center for Education Statistics [NCES], 1999a). Consequently, they constitute an important population for the questions of interest. The sample consisted of school dropouts, academically at-risk students (i.e., those with a low GPA), and control students. Using this design allowed us to compare the health of dropouts with that of enrolled students and to examine the relation between academic achievement and health in enrolled students.

The first goal of this study was to explore the relation between educational attainment and cigarette smoking in Hispanic adolescents. During adolescence, cigarette smoking is typically higher among students with poor academic achievement including lower grades (e.g., Hover & Gaffney, 1988; Young & Rogers, 1986), achievement scores (Salber, MacMahon, & Elsh, 1962), and educational expectations (e.g., Schulenberg, Bachman, O’Malley, & Johnston, 1994). In addition, school dropouts have higher levels of smoking than do students currently attending school (Pirie, Murray, & Luepker, 1988; Wang, Fitzhugh, Eddy, & Westerfield, 1998; Weng, Newcomb, & Bentler, 1988). However, data on educational attainment and smoking in Hispanic adolescents are relatively sparse (U.S. Department of Health and Human Services [USDHHS], 1998). Only a handful of studies have examined the relation between poor academic achievement and smoking in Hispanic students (Dusenbury et al., 1992; Schinke et al., 1992; Sussman, Dent, Flay, Hansen, & Johnson, 1987). Moreover, there have been only two studies of Hispanic dropouts’ cigarette use during adolescence.

The first study of smoking in Hispanic dropouts is a preliminary analysis of data from the current project (including approximately one-sixth of the full sample). That analysis revealed that for both MAs and nHws, dropouts were more likely than controls to have smoked during the previous 30 days (Chavez, Edwards, & Oetting, 1989). The second project to examine cigarette smoking in Hispanic adolescents is the National Household Survey on Drug Abuse (NHSDA). NHSDA data for 1998 (Substance Abuse and Mental Health Services Administration, 2000) indicate that 19.4% of nHw students and 13.9% of Hispanic students have smoked within the previous 30 days, compared with 53.2% of nHw dropouts and 41.2% of Hispanic dropouts. These data suggest that Hispanic dropouts smoke more than do their peers who are attending school. Similarly, data on smoking prevalence in adults suggest that differences in smoking as a function of educational attainment exist for Hispanics, but they are smaller than for nHws (Escobedo, Anda, Smith, Remington, & Mast, 1990). Based on this pattern of results, we hypothesized that for both ethnic groups, school dropouts would show the highest levels of cigarette smoking, followed by at-risk students, and then control students. However, we expected that differences in smoking as a function of educational attainment would be smaller for MA than for nHw adolescents.

In addition to exploring the negative relation between educational attainment and cigarette smoking, a second goal of this study was to examine the relation between educational attainment and perceived relative health during adolescence. Previous research suggests that among currently enrolled students, academic achievement is positively related to perceived health (Glendinning, Love, Hendry, & Shucksmith, 1992; Mechanic & Hansell, 1987; Vingilis, Wade, & Adlaf, 1998; Wade, Pevalin, & Vingilis, 2000). Similarly, there is some evidence that dropouts perceive their health to be worse than their peers’ (Chavez et al., 1989). Thus, we hypothesized that educational attainment would be positively related to perceived relative health.

The relation between ethnicity and perceived health during adolescence was also explored in this study. To date, only Chavez et al. (1987) and Wade et al. (2000) have assessed perceived health in Hispanic adolescents. Wade et al. found no significant differences in the perceived health of Hispanic and non-Hispanic adolescents (Pevalin, personal communication, March 18, 2001). Similarly, the percentages presented in Chavez et al. are not suggestive of a significant effect of ethnicity. Research on ethnic differences in children’s health reveals an inconsistent pattern of findings. Specifically, Hispanic mothers’ ratings of their children’s health are lower than national averages (Arcia, 1998); however, Hispanic children evidence advantages on some indicators of children’s health including activity limitation due to chronic illness (National Center for Health Statistics, 1999). Consequently, we examined ethnic differences in perceived health but advanced no hypotheses.

The final goal of this study was to examine possible mechanisms for the link between educational attainment and health. Several explanations have been advanced for the relation between low educational attainment and poor health, including shared etiology, health selection, and differential rates of health-related behaviors (Marmot & Feeney, 1997). Shared etiology suggests that common background
factors result in both poor health and low educational attainment. Health selection indicates that poor health can worsen an individual's educational outcomes. Finally, behavioral explanations indicate that those with less education engage in more negative health behaviors. We investigated each of these potential mechanisms. First, the effect of shared etiology was measured through parents' educational attainment. In the United States, children whose parents are school dropouts have significantly worse health (National Center for Health Statistics, 1998), and they are also less likely to complete high school than are the children of more educated parents (NCES, 1999a). Consequently, any observed relation between health and educational attainment during adolescence might in fact reflect the effects of parental educational attainment. Second, we assessed health selection by asking dropouts whether health problems played a role in their decision to leave school. In the High School and Beyond study conducted in the early 1980s, only 6% of dropouts reported illness as a reason for leaving school (Ekstrom, Goertz, Pollack, & Rock, 1986). As a result, we expected that health selection would not be a significant factor in the relation between educational attainment and health. Finally, we examined the behavioral factor of cigarette smoking. In the adult literature, cigarette smoking has been identified as an important behavioral contributor to the poor health outcomes of less educated individuals (Stellman & Resnicow, 1997). Given that adolescents who smoke cigarettes rate their health as significantly worse than do nonsmokers (Arday et al., 1995), cigarette smoking may play a role in the relation between educational attainment and health during adolescence. We hypothesized that the relation between educational attainment and adolescents' perceived relative health would be mediated by smoking.

**Method**

**Participants**

The sample consisted of 3,360 (1,822 male and 1,538 female) participants, ranging in age from 12 to 21 years ($M = 16$ years, 7 months). Participants were drawn from three communities in the southwestern United States with populations of 30,000, 90,000, and 350,000. The ethnic make-up of the sample was 62.6% MA, 33.3% nHw, 0.7% African American, 0.6% Native American, and 0.8% other ethnicities. (information on ethnicity was missing for 1.9% of the sample). Only nHw and MA participants were included for analysis due to the small number of participants in the other categories.

The sample included 990 control students (635 MA, 355 nHw), 1,016 at-risk students (691 MA, 325 nHw), and 1,213 school dropouts (774 MA, 439 nHw). Dropouts were defined as 7th through 12th graders who had not attended school in more than 30 days, not transferred to another school, and not sought readmission. Each month, school records were used to identify a random sample of dropouts. In some cases, multiple attempts were needed to locate and contact the dropouts. However, all participants met criteria for inclusion when they were surveyed. Students in the two comparison groups were matched to the dropout for last school attended, grade, gender, ethnicity, and age. Academically at-risk students were also matched as closely as possible to the dropout on GPA. It was not always possible to match participants on GPA because many dropouts have a GPA of 0 or .5 and very few enrolled students have grades that low. The comparison students were drawn randomly from those who met the matching criteria. Individuals could be randomly selected only once during the study.

GPAs were provided by the school (junior high school GPAs for students who were last enrolled in 7th through 9th grade, and high school GPAs for 10th through 12th graders). Mean GPAs were as follows: 2.55 for controls, 1.65 for academically at-risk students, and 1.43 for dropouts. As these means show, the academically at-risk students were performing significantly more poorly than were the controls ($t [1,586] = 22.03$, $p = .000$). In addition, the GPA for the dropouts was significantly worse than for either the controls ($t [1,718] = 27.43$, $p = .000$) or the at-risk students ($t [1,746] = 8.40$, $p = .004$).

**Procedure**

Potential participants were contacted by a school district employee whose time was allocated to the project. Dropouts, students, and their parents were contacted by phone, mail, and, in some cases, face-to-face contact. Potential participants and their parents were asked to provide informed consent, which resulted in low attrition (MA: 3.6% and 5.3%, dropout and in school samples, respectively; and nHw: 5.6% and 7.8%, dropout and in school samples, respectively). Nonresponding youths were replaced from the appropriate sampling groups. Following receipt of
consent, participants completed several surveys. The surveys dealt with tobacco, alcohol and other drug use, delinquent behavior, cultural identity, and psychosocial factors related to drug use and dropping out. Surveys were administered individually in a location of the participant's choosing. To ensure the participants of the confidentiality of their responses, participants’ names and identifying information were retained by school district personnel who were never in possession of the survey data. Immediately after completing the survey, the participant was accompanied to a nearby mailbox to mail the survey directly to the research team. Participants received $10 (in-school youths) or $20 (dropouts) for participation.

Measures

Cigarette Smoking. Smoking was defined by combining self-reports of lifetime and 30-day use. The lowest level of cigarette use was defined by never having smoked (1 = nonsmoker). The next level consisted of those who had smoked, but not in the previous 30 days (2 = current nonsmoker). Subsequent levels of cigarette use were based on smoking during the previous month (3 = less than 1 cigarette/day, 4 = 1–5 cigarettes/day, 5 = half a pack/day, 6 = a pack/day, and 7 = more than a pack/day). Heavy smokers were defined as those who smoke at least half a pack of cigarettes per day.

Perceived Relative Health. Participants rated their health compared to others their age from 1 = much worse to 5 = much better. The perceived relative health measure was positively related to participants’ reported health problems during the previous 2 years (i.e., serious illness, \( r[2,344] = 15, p = .000 \); number of weeks of work/school missed due to illness, \( r[1,170] = .16, p = .000 \); and number of doctor visits, \( r[2,301] = .17, p = .000 \)). The health questionnaire was administered to participants only during the first 5 years of the project. Consequently, the sample size for the perceived health analyses was 2,349.

Parent Education. Participants were asked to report how many years of schooling each of their parents had completed. These were combined into a single composite measure.

Reasons for Leaving School. Dropouts were asked to rate how important various reasons were for their leaving school. The only reason included in the current analysis was illness. (Of the 876 participants identified as dropouts during the first 5 years of the project, only 692 answered the question regarding the importance of illness as a reason for leaving school, because participants who viewed themselves as still being in school, despite not having attended for the previous 30 days, were instructed not to answer the question.)

Results

Cigarette Smoking

A 3 × 2 × 3 × 2 ANOVA was performed on cigarette use with age (3: 12–14 years; 15–17 years; and 18 years and older), ethnicity (2: MA and nHw), educational attainment (3: control, academically at-risk, and dropout) and gender (2) as the factors. Full models were run initially for all analyses. After this first step, we removed nonsignificant interactions from the model and repeated the analysis. Results presented are for the reduced models. The following effects were significant: educational attainment, \( F(2, 3,186) = 200.43, p = .000 \); ethnicity, \( F(1, 3,186) = 85.91, p = .000 \); and the Educational Attainment × Ethnicity interaction, \( F(2, 3,186) = 9.18, p = .000 \). The adjusted \( R^2 \) for the model was .13. Surprisingly, the effect of age on smoking was nonsignificant (\( p = .746 \)). Examination of the means revealed that for dropouts, smoking levels for early and late adolescents were virtually identical (3.68 and 3.65), whereas for the control group, they were 1.97 and 2.38, respectively. Thus, age differences apparently were not evident here because the study included large numbers of dropouts, who are far more likely to smoke at an early age.

The main effects of educational attainment and ethnicity will not be discussed, due to the presence of the significant two-way interaction; however, adjusted smoking means are presented in Table I. Examination of the Educational Attainment × Ethnicity interaction showed that the difference in cigarette use as a function of educational attainment was somewhat larger for nHw than for MA adolescents. Specifically, the means for nHw controls, at-risk students, and dropouts were 2.40, 3.27, and 4.23, respectively, compared with 2.09, 2.74, and 3.29, for the MA participants. However, follow-up \( t \) tests revealed that the effect of ethnicity was significant at every level of educational attainment (\( ps < .001 \) and that control students, academically at-risk students, and dropouts evidenced significantly different levels of smoking for both ethnic groups (\( ps = .000 \)). Thus, although the difference as a function of educational attainment was smaller for MA adolescents than it was for nHw adolescents, the results suggest that
drops smoke more than enrolled students, regardless of ethnicity.

Given that the health implications of regular smoking are of important practical significance, we also examined the relation between educational attainment and heavy smoking. A logistic regression was performed (using SPSS NOMREG) with heavy smoking as the dependent variable (nonsmokers and experimental smokers were combined in the comparison group) and ethnicity, educational attainment, and their interactions as the predictors. Educational attainment was dummy coded so that the control students were the reference group. Two dummy variables, Ed1 and Ed2, were created; Ed1 was equal to 1 for dropouts and 0 for all others, and Ed2 was equal to 1 for academically at-risk students and 0 for all others. The likelihood ratio tests for this analysis revealed that the fit of the model was not improved by the presence of the interactions. That is, in contrast with our previous findings, nHws (Table I); however, females accounted for the majority of that difference. Follow-up tests revealed that nHw girls reported significantly worse health than did MA girls (t[1,017] = 5.93, p = .000). In contrast, the perceived health of MA and nHw boys did not differ (p = .34). As expected, there was a positive relation between educational attainment and perceived relative health. Adjusted means are presented in Table I. Control students reported significantly better health than did either at-risk students (t[1,445] = 2.67, p = .008) or dropouts (t[1,595] = 4.34, p = .000). However, academically at-risk students and dropouts did not differ in their ratings of perceived health (p = .109). These results suggest that adolescents’ perceived health relative to their peers varies as a function of educational attainment. In the next series of analyses, three possible mechanisms for the relation between educational attainment and health were explored: shared etiology, health selection, and health behavior.

First, we investigated the effect of shared etiology. Parent education was used as the shared etiological factor. The shared etiology hypothesis suggests that the following conditions should hold: (1) parent education should be positively related to the adolescent’s educational attainment (i.e., dropout, at-risk or control); (2) parent education should be negatively re-

**Perceived Relative Health**

A $3 \times 2 \times 3 \times 2$ ANOVA was performed on perceived relative health with age (3), ethnicity (2), educational attainment (3), and gender (2) as the factors. This analysis revealed significant effects of educational attainment, $F(2, 2,251) = 11.39, p = .000$; ethnicity, $F(1, 2,251) = 25.24, p = .000$; gender, $F(1, 2,251) = 60.46, p = .000$; and Ethnicity $\times$ Gender, $F(1, 2,251) = 13.36, p = .000$.

The main effect of ethnicity was due to MA adolescents reporting better health on average than nHws (Table I); however, females accounted for the majority of that difference. Follow-up tests revealed that nHw girls reported significantly worse health than did MA girls (t[1,017] = 5.93, p = .000). In contrast, the perceived health of MA and nHw boys did not differ (p = .34). As expected, there was a positive relation between educational attainment and perceived relative health. Adjusted means are presented in Table I. Control students reported significantly better health than did either at-risk students (t[1,445] = 2.67, p = .008) or dropouts (t[1,595] = 4.34, p = .000). However, academically at-risk students and dropouts did not differ in their ratings of perceived health (p = .109). These results suggest that adolescents’ perceived health relative to their peers varies as a function of educational attainment. In the next series of analyses, three possible mechanisms for the relation between educational attainment and health were explored: shared etiology, health selection, and health behavior.

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### Table I. Mean Cigarette Smoking and Perceived Health by Educational Attainment and Ethnicity

<table>
<thead>
<tr>
<th>Outcome</th>
<th>Educational attainment</th>
<th>Effect size</th>
<th>Ethnicity</th>
<th>Effect size</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Control</td>
<td>At-risk</td>
<td>Dropout</td>
<td>$\eta^2$ = .11</td>
</tr>
<tr>
<td>Cigarette smoking</td>
<td>2.21</td>
<td>2.98</td>
<td>3.73</td>
<td>3.27</td>
</tr>
<tr>
<td>% heavy smokers</td>
<td>9.1</td>
<td>21.9</td>
<td>39.2</td>
<td>$R^2_{\eta} = .12$</td>
</tr>
<tr>
<td>Perceived health</td>
<td>3.58</td>
<td>3.46</td>
<td>3.37</td>
<td>$\eta^2 = .01$</td>
</tr>
</tbody>
</table>

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lated to the adolescent’s perceived health; and (3) when the effect of parental education is controlled for, the effect of the adolescent’s educational attainment on perceived health should decrease. The first assumption was tested with a 3 × 2 ANOVA, with parent education as the dependent variable and the adolescent’s educational attainment (3) and ethnicity (2) as the independent factors. This analysis revealed significant effects of both ethnicity, $F(1, 3,042) = 576.81, p = .000$, and educational attainment, $F(2, 3,042) = 96.58, p = .000$. Follow-up $t$ tests supported the first assumption of shared etiology. The parents of the control students had significantly higher levels of education ($M = 12.58$) than did either the at-risk students ($M = 11.95, t[1,957] = 5.79, p = .000$) or the dropouts ($M = 12.05, t[2,125] = 5.01, p = .000$). The parents of the at-risk students and dropouts did not differ significantly in their years of education. The second assumption of the shared etiology hypothesis was tested by correlating parent education with the adolescent’s perceived health, while controlling for the effect of ethnicity. This assumption of shared etiology was also supported. Parent education was negatively related to the adolescent’s perceived health ($r[2,140] = -.07, p = .001$). The final assumption of the shared etiology hypothesis was tested by performing an ANCOVA on the adolescent’s perceived health with the adolescent’s educational attainment, ethnicity, and gender as the factors and parent education as the covariate. The results of this analysis did not support the shared etiology hypothesis. Although the effect of parent education was significant, $F(1, 2,125) = 5.09, p = .024$, the effect of the adolescent’s educational attainment was also significant, $F(2, 2,125) = 9.32, p = .000$. Moreover, the $\eta^2$ for the adolescent’s educational attainment did not change with the addition of parent education to the model. These results suggest that the shared etiological factor of parent education is not responsible for the relation between educational attainment and perceived health.

The second mechanism to be explored was health selection. Health selection suggests that poor health negatively affects educational attainment. Consequently, in this study, health selection was investigated through dropouts’ ratings of sickness as their reason for leaving school. Only 13.4% of the MA dropouts and 13.6% of the nHw dropouts reported that their health was very important in their decision to leave school. This percentage is higher than that obtained by Ekstrom et al. (1986); however, it still suggests that illness does not play a large role in school dropout. When these participants were excluded from the sample, differences in perceived health as a function of educational attainment continued to be significant.

The final mechanism to be examined was the behavioral factor of cigarette use. The mediating role of cigarette use was tested through a series of analyses, consistent with the recommendations of Holmbeck (1997). Specifically, four underlying assumptions were tested: (1) educational attainment is significantly related to perceived health, (2) educational attainment is significantly related to cigarette use, (3) cigarette use is negatively related to perceived health (with educational attainment in the model), and (4) when cigarette use is entered into the model with educational attainment, the effect of educational attainment on perceived health is reduced. Ethnicity was entered in each of these models as a control variable. The first two assumptions necessary for testing this mediating model, significant relations between educational attainment and perceived health and between educational attainment and cigarette smoking, were demonstrated earlier; thus, we move on to a test of the third assumption. A multiple regression was performed in which cigarette use and ethnicity were regressed on perceived health. This analysis provided support for the third assumption of the mediating model. Specifically, cigarette use was significantly related to perceived health ($\beta = -.15, t[2,327] = 6.82, p = .000$). To test the final assumption, an ANCOVA was performed on perceived health with cigarette use as the covariate and educational attainment, ethnicity, gender, and age as the factors. Similar to the results of the original ANOVA in which perceived health was the dependent variable, the effects of ethnicity, gender, age, and Ethnicity × Gender were all significant. However, adding cigarette use into the model affected the estimated relation between educational attainment and perceived relative health. Specifically, the effect of educational attainment was now only marginally significant, $F(2, 2,231) = 2.97, p = .051$, and the $\eta^2$ for educational attainment dropped from .11 to .003. In contrast, the effect of cigarette use was significant, $F(1, 2,231) = 46.61, p = .000$, $\eta^2 = .02$. A significance test of the mediated effect was conducted using the procedure outlined by Holmbeck (2002). This analysis revealed that the effect of educational attainment on perceived health was significantly mediated by cigarette use ($z = 6.69, p = .000$). (To obtain the betas needed to perform this test, the ANCOVA analysis of the final assumption was repeated with a regression analysis.)
Discussion

Although the relation between educational attainment and health is well documented in adults, there have been few studies of adolescents, especially those of Hispanic origin. In this study Mexican American and non-Hispanic white students and school dropouts were asked to report on their smoking and perceived relative health. Our findings suggest that educational attainment is a significant health risk factor during adolescence. As expected, school dropouts from both ethnic groups reported smoking more than did their peers who were attending school, even students who were academically at-risk. It was not merely that the dropouts were more likely to have experimented with cigarettes, but rather that they showed dramatically higher rates of heavy smoking. In addition, this study was the first to demonstrate that even as adolescents, school dropouts report poorer health than their peers who are attending school.

The implications of these findings are particularly significant for Hispanic youths, because of the high rate of school dropout in the Hispanic community. For example, in 1998, 29.5% of 16- to 24-year-old Hispanics were school dropouts, compared with 7.7% of non-Hispanic whites (NCES, 1999b). As a result, in-school samples underestimate the health problems of Hispanic adolescents. The same is true of the ethnicity main effects obtained in this study. The means presented in Table I show that Mexican American adolescents smoked less and had higher mean levels of perceived health than did non-Hispanic white adolescents. However, the samples of non-Hispanic white and Mexican American adolescents were designed to include approximately equal percentages of dropouts. Given that non-Hispanic white adolescents are much less likely to drop out of school, the health problems of non-Hispanic white adolescents have been overestimated in this study. Swaim, Beauvais, Chavez, and Oetting (1997) conducted a formal demonstration of this phenomenon for substance use. When rates of adolescent alcohol, marijuana, and cocaine usage were adjusted to reflect the percentage of Mexican Americans and non-Hispanic whites who drop out of school, Mexican Americans showed higher rates of current use. Consequently, it is extremely important for researchers and clinicians not to dismiss the potential impact of low educational attainment on the health of Hispanic youths.

Although educational attainment was negatively related to perceived health in this study, the magnitude of the relationship was relatively small. This is consistent with the findings of other studies of perceived health during adolescence (Wade et al., 2000). It seems likely that the relation between educational attainment and health is weaker during adolescence than during adulthood. For example, many adolescent dropouts may be insulated from the stress of low educational attainment because they are receiving financial support from the family of origin. In addition, the impact of behavioral factors such as smoking may accumulate over the course of one's lifetime so that the effect of that negative health behavior is not fully felt during adolescence.

Mechanisms of the Relation Between Educational Attainment and Health

This study examined several reasons for the relation between school dropout and perceived health. The first to be tested was shared etiology, in the form of parent education. Consistent with the premise of shared etiology, parent education was related to the adolescent's educational attainment and cigarette smoking. However, parent education did not account for the relation between educational attainment and perceived health. These results suggest that the shared etiological factor of parent education is not responsible for the relation between educational attainment and perceived health. The second explanation to be examined was health selection. When asked how important illness was in their decision to leave school, only 13% of the dropouts reported that it was very important. Thus, in comparison with school-related factors such as bad grades, illness plays a fairly small role in the decision to leave school. These results are consistent with the Black report (Black, Morris, Smith, Townsend, & Whitehead, 1988), which concluded that health selection is not the primary reason for the relation between poor health and low educational attainment. Finally, the mediating role of cigarette smoking in the relation between educational attainment and perceived health was explored. The results indicate that the poorer health of school dropouts is mediated by cigarette smoking. Specifically, the relation between educational attainment and perceived health was significant when education was entered into the model alone, but was nonsignificant when cigarette smoking was also in the model.

Given that cigarette smoking is an important part of the link between educational attainment and health, greater research attention should be directed
to understanding the role of educational attainment in the development of smoking. To date, several theories have been advanced to explain the relation between educational attainment and substance use, including strain theory, peer cluster theory, and the third variable explanation. Strain theory suggests that some adolescents seek out deviant self-defining behaviors because they are frustrated by their failure in school (Agnew, 1985). Alternatively, peer cluster theory (Oetting & Beauvais, 1987) suggests that involvement with deviant peers is the primary cause of drug use, but that having strong bonds to family and school decreases the likelihood of association with deviant peers. In contrast, some researchers (e.g., Fagan & Pabon, 1990) have suggested that academic performance and drug use may not be causally related; rather, they might be correlated because both are caused by the same constellation of personality, family, and peer factors.

Extensive research support is not available for any of these theories, especially for Hispanic adolescents. Although some studies have confirmed a positive relation between school stress/strain and cigarette smoking (e.g., Byrne & Mazanov, 1999), these data do not necessarily support strain theory. First, most studies have been cross-sectional, and consequently the causal relation between stress and smoking is not unambiguous (Parrott, 1999). Second, these studies have failed to establish a negative relation between academic performance and school stress/strain (Brunswick & Messeri, 1984). In comparison with strain theory, there is much greater support for peer cluster theory. Moreover, peer cluster theory does appear to be applicable to cigarette use in Hispanic adolescents (e.g., Swaim, Oetting, & Casas, 1996).

Support for the third variable explanation comes from a pattern of similar correlates of poor academic achievement and substance use including impulsivity (Labouvie & McGee, 1986; Weithorn, Kagen, & Marcus, 1984), authoritative parenting (Baumrind, 1991; Steinberg, Elmen, & Mounts, 1989), and peer influence (Kasen, Cohen, & Brook, 1998; Swaim et al., 1996). The plausibility of the third variable explanation is weakened by the fact that it cannot explain why Hispanic adolescents are less likely to smoke, but more likely to drop out of school than are non-Hispanic white adolescents. However, it might be true that there are some shared and some nonshared etiological factors for school failure and cigarette use. For example, in Hispanic youths, acculturation is positively related to cigarette smoking (USDHHS, 1998) and negatively related to dropping out (NCES, 1999c). Future research aimed at identifying these shared and nonshared factors could shed important light on the socialization processes underlying school failure and adolescent substance use.

Limitations

Several methodological features of this study should be considered when evaluating our findings. First, self-report measures were used for both smoking and perceived health. Thus, method bias might have inflated the observed relation between the variables. In addition, self-report measures can be subject to bias. Perceived measures of health may be influenced by a number of factors, of which physical health is only one. Perceived health ratings are more likely to be reflective of a sense of diminished functioning and well-being rather than physical symptoms (Mechanic & Hansell, 1987; Vingilis et al., 1998). Given the generally good health of this age group, perceived health ratings may be more sensitive to emerging differences in physical health than are measures of physical symptoms. However, it would be beneficial for future studies to include measures of physical symptomatology as well as perceived health.

Another limitation of this study was the cross-sectional design. Future research in this area should attempt to utilize longitudinal data to more fully explore causal explanations. Finally, this study is limited by the instability of educational attainment during adolescence. Follow-up data were collected with a subsample from the present study 3 to 6 years following the original measurement. Those data reveal that approximately one-third of the dropouts subsequently graduated from high school and approximately one-third of the academically at-risk students dropped out of school. Clearly, the fluidity of educational attainment works against finding differences between adolescent dropouts and students.

Clinical Implications

The results of this study suggest that addressing the problem of cigarette smoking in school dropouts is likely to reduce the social inequalities in health currently observed in the United States. During the last few decades, cigarette smoking has decreased in more educated adults, but this is not the case for school dropouts (Escobedo & Peddicord, 1996; Pierce, Fiore, Novotny, Hatzianandrea, & Davis, 1989). Unfortunately, without smoking cessation, school dropouts are likely to continue to experience poor health as
adults. In addition to being heavy smokers, dropouts are less likely to have access to medical care (National Center for Health Statistics, 1999b), more likely to be unemployed, and less likely to have health insurance (Census Bureau, 1999). Taken together, these characteristics point to an important public health problem. For example, current data suggest that cancer is more prevalent, and more deadly, in the unemployed. This difference in cancer mortality is mostly accounted for by differences in lung cancer rates (Lynge, 1997). Lung cancer is also the leading cancer killer among Hispanics (USDHHS, 1998).

Clearly, it is important for school-based interventions to start early to target all youths before they begin to drop out and become more insulated from intervention. However, the results of this study indicate that many adolescents who are experiencing academic failure are already in need of smoking cessation. Approximately 40% of adolescents who smoke daily have tried to quit and failed (USDHHS, 1994). However, the earlier adolescents attempt to quit, the more likely it is that they will be successful (Ershler, Leventhal, Fleming, & Glynn, 1989). In the school setting, it might be useful to consider adding smoking cessation to the services provided to at-risk students. In addition, psychologists who are treating adolescents for school-related difficulties (either behavioral or academic) should be cognizant of the potential for these individuals to benefit from a smoking cessation program. We hope that by increasing awareness of educational attainment as a health risk factor that smoking cessation and other health services will be targeted more effectively.

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