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Tobacco Promotion and the Initiation of Tobacco Use: Assessing the Evidence for Causality

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ABSTRACT

OBJECTIVE. We sought to determine whether there is evidence of a causal link between exposure to tobacco promotion and the initiation of tobacco use by children.

METHODS. We conducted a structured search in Medline, PsycINFO, and ABI/INFORM Global to identify relevant empirical research. The literature was examined against the Hill epidemiologic criteria for determining causality.

RESULTS. (1) Children are exposed to tobacco promotion before the initiation of tobacco use; (2) exposure increases the risk for initiation; (3) there is a dose-response relationship, with greater exposure resulting in higher risk; (4) the increased risk is robust; it is observed with various study methods, in multiple populations, and with various forms of promotion and persists after controlling for other factors; (5) scientifically plausible mechanisms whereby promotion could influence initiation exist; and (6) no explanation other than causality can account for the evidence.

CONCLUSIONS. Promotions foster positive attitudes, beliefs, and expectations regarding tobacco use. This fosters intentions to use and increases the likelihood of initiation. Greater exposure to promotion leads to higher risk. This is seen in diverse cultures and persists when other risk factors, such as socioeconomic status or parental and peer smoking, are controlled. Causality is the only plausible scientific explanation for the observed data. The evidence satisfies the Hill criteria, indicating that exposure to tobacco promotion causes children to initiate tobacco use.

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Key Words

advertising, tobacco advertising, tobacco, tobacco control, child, adolescent, smoking, smoking initiation

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ADDICTION TO TOBACCO typically begins during childhood and contributes to >4 million deaths worldwide each year.^{1,2} Children in most countries are immersed in a sea of tobacco promotion. According to the most recent data from the Federal Trade Commission, US tobacco companies spent \$15.15 billion on promotion during 2003, or \$50 per capita for the US population, which included 72.2 million children who were younger than 18 years.^{3,4} The tobacco industry claims that their promotional activities have no adverse impact on children,⁵ an assertion that has been hotly disputed by public health advocates. The industry argued for decades that human randomized, controlled trials are the only method by which the harmfulness of smoking can be proved. By extension, they might argue that the only acceptable proof that their promotion adversely affects children would be to conduct a randomized, controlled trial to determine whether they can be induced to smoke. Given the lethality of tobacco use, this would be unethical. Industry supporters argue that in the absence of such evidence, there is no scientific justification for constraints on tobacco promotional efforts.⁶

Government officials often must decide whether to regulate potentially toxic exposures without data from randomized, controlled human trials, relying instead on other forms of evidence. Epidemiologists have established rigorous criteria for determining whether a causal link exists between exposure to a risk factor and development of a disease.^{7,8} The Hill criteria include strength of association, preferably a dose-response relationship; consistency of the association across populations and study methods; temporally correct association, with exposure antecedent to the disease; and biological plausibility. This article is the first to evaluate the literature on tobacco promotion against the Hill criteria to determine whether the evidence supports a conclusion that exposure to promotional activities causes children to initiate tobacco use.

METHODS

Historically, tobacco has been marketed through multiple strategies: print ads in newspapers and magazines; outdoor advertising; television and radio commercials; posters and displays at the point of purchase; sports sponsorship; package design; product placement in movies and television; and tobacco logos on a variety of promotional items, including candy cigarettes and toys. All forms of tobacco industry-sponsored promotion were considered for this review.

Using Ovid, we conducted a literature search for relevant articles in Medline (1966–2005), PsycINFO (1985–2005), and ABI/INFORM Global (1971–2005) using the following search strategy: (1) advertising or tobacco advertising.mp; (2) adolescent; (3) smoking or smoking initiation.mp; and (4) 1 and 2 and 3 limited to English language and humans. From the resulting 305

articles, we excluded all articles that did not report on scientific studies. We also excluded as irrelevant all articles whose primary focus was (1) tobacco in the context of disease, (2) adult tobacco use, (3) law or policy, (4) antitobacco campaigns, (5) effects of advertising on adult tobacco consumption, and (6) a comparison of smoking rates across nations without controlling for any factor other than advertising. Using the relevant articles as a base we conducted a related-articles search in PubMed and used the snowball technique to find additional citations. Tobacco and advertising industry documents were not searched because previous reviews of these sources failed to locate any industry studies that addressed our topic.^{9–17} All relevant articles were considered, including any that challenged an interpretation of causality.

We operationalized Hill's standards for establishing causality⁷ by defining 6 criteria against which to assess the evidence: (1) children are exposed to tobacco promotions before the initiation of tobacco use; (2) exposure increases the risk for initiation; (3) there is a dose-response relationship, with greater exposure resulting in higher risk; (4) the increased risk is robust; it is observed with various study methods, in multiple populations, and with various forms of promotion and persists after controlling for other factors; (5) scientifically plausible mechanisms whereby promotion could influence initiation exist; and (6) no explanation other than causality can account for the evidence.

RESULTS

Are Children Exposed to Tobacco Promotion Before the Initiation of Tobacco Use?

Children are almost universally exposed to tobacco promotion before age 11, when tobacco use still is rare.¹⁸ Exposure in young children is difficult to measure directly; however, it can be inferred from their awareness of tobacco brands and logos. Table 1 lists 16 studies that demonstrated that children are exposed to tobacco promotion before using tobacco. From 75% to 81% of 6-year-olds in the United States were familiar with the Joe Camel cartoon character,^{19–21} and they identified Joe Camel as often as the Disney Channel Mickey Mouse logo.¹⁹ Children as young as 9 are attracted by cigarette advertisements and enjoy looking at them.²² In Turkey, among children with a mean age of 10, the Camel logo (dromedary and pyramid) had the highest recognition rate among the cigarette logos tested (91%), although Camel had only a 1% market share and Joe Camel had not been used in ads.²³

Tobacco promotion also can target nonsmoking adolescents. Almost 60% of California youths who were aged 12 to 13 years and had never smoked identified a favorite cigarette advertisement, demonstrating previous exposure.²⁴ Cigarette-promotional items such as shirts, hats, and backpacks with brand logos have been distrib-

TABLE 1 Are Nonsmoking Children Exposed to and Aware of Tobacco Promotion?

Study	N	Age, y	Location	Outcome
Prospective studies				
Albers and Biener ¹³⁰ (2003)	468	12–15	United States	Never-smokers owned promotional items
Charlton and Blair ⁴⁴ (1989)	2338	12–13	England	Never-smokers had favorite cigarette advertisements, named cigarette brands, and watched tobacco-sponsored sports on television
Health Education Authority ⁴⁶ (1993)	437	5–10	England	The “Reg” cartoon character was familiar and appealing to young children
Pucci and Siegel ⁸⁴ (1999)	5451	11–15	United States	Youth who initiated smoking during the 4-y follow-up period were more likely to smoke the brands whose advertising they had seen most often at baseline
Cross-sectional studies				
Altman et al ²⁵ (1996)	1047	12–17	United States	Never-smokers were familiar with cigarette-promotion campaigns
Arnett ¹³¹ (2001)	400	12–17	United States	Nonsmokers thought that ads made cigarette smoking more appealing
Charlton ²² (1986)	1981	8–13	England	Never-smokers named cigarette brands and favorite cigarette ads
Coyoteaux et al ²⁶ (1995)	1047	12–17	United States	Never-smokers were familiar with cigarette-promotion campaigns
Emri et al ²³ (1998)	1093	7–13	Turkey	Never-smokers matched Camel and Marlboro brand names and logos with cigarettes
Evans et al ²⁴ (1995)	3536	12–17	United States	Never-smokers identified messages contained in cigarette advertising and named favorite ads
Fischer et al ¹⁹ (1991)	229	3–6	United States	Never-smokers linked Joe Camel to cigarettes
Gilpin et al ⁶³ (1997)	7266	12–17	United States	Approximately 90% of sixth graders who owned a cigarette-promotional item were nonsmokers
Henke ²⁰ (1995)	83	3–8	United States	A majority of 3-y-olds identified Joe Camel as a cigarette logo
Mizerski ²¹ (1995)	790	3–6	United States	In a study sponsored by RJ Reynolds Tobacco Company, 6-y-olds matched Joe Camel with cigarettes as often as they matched Tony the Tiger with cereal
Peters et al ⁷⁰ (1995)	9591	8–15	Hong Kong	Tobacco brand names and logos were familiar to almost 75% of 8-y-olds
Sargent et al ⁵³ (2000)	1265	10–19	United States	Nearly 20% of youth who had never smoked reported owning a cigarette-promotional lighter

uted by tobacco companies, a practice that now is banned in the United States but continues in most other countries. A survey that was conducted in 1993 indicated that >80% of a national sample of American non-smoking youth who were aged 12 to 17 years were familiar with various tobacco promotional campaigns, and 28% had participated by collecting coupons or acquiring an item.²⁵ An estimated 7.4 million minors (both smokers and nonsmokers), representing ~35% of US adolescents, had participated in a tobacco promotional campaign by obtaining a catalog, coupons, or an item.^{26,27}

Does Exposure Increase the Risk for Initiation?

Nonsmoking youth who cannot state with certainty that they would refuse an offer of tobacco are considered susceptible to smoking.²⁸ Most young children express antismoking attitudes,^{20,21,29–31} so the initiation of tobacco use often is predicted by a shift in susceptibility. Susceptible youth show two- to threefold higher rates of subsequent experimentation with tobacco.^{28,32} Table 2 summarizes 12 prospective, 14 cross-sectional, and 2 time-

series studies that demonstrated that exposure to tobacco promotions increases the risk for initiation or progression toward regular tobacco use. Receptivity toward or exposure to tobacco promotions has been demonstrated in a number of studies to increase susceptibility among nonsmokers.^{24,33–35} Wanting or owning a tobacco promotional item is associated with substantial increases in susceptibility to smoking.^{25,27,36–38} Among youth who had decided against smoking, those with the greatest familiarity with cigarette advertising were most likely to reverse their opinion of smoking and adopt an intention to smoke.³⁹ This was true even after controlling for potentially confounding factors, such as peer and parental influences.

On the basis of evidence from 9 longitudinal studies that involved >12 000 nonsmokers, the authors of a recent critical review concluded that “tobacco advertising and promotion increases the likelihood that adolescents will start to smoke.”⁴⁰ For example, high receptivity to tobacco promotion doubled or tripled the odds of becoming a smoker during 4 years of monitoring.⁴¹ Approval of cigarette advertising doubled the future risk for

TABLE 2 Does Exposure to Promotions Increase the Risk of Initiation?

Study	N	Age, y	Location	Outcome
Prospective studies				
Aitken et al ³⁹ (1991)	640	11–14	Scotland	Recognition of cigarette ads predicted the development of intentions to smoke
Alexander et al ⁴² (1983)	5616	10–12	Australia	Children who approved of cigarette advertising were twice as likely to initiate smoking as children who disapproved
Armstrong et al ⁴³ (1990)	2366	12–13	Australia	There was a 15% increase in the uptake of smoking among youth who felt influenced by cigarette advertising in comparison with those who did not feel influenced
Audrain-McGovern et al ⁴¹ (2004)	968	14–17	United States	High receptivity to tobacco promotion doubled or tripled the odds of becoming a smoker over 4 y of monitoring
Biener and Siegel ⁵² (2000)	402	12–15	United States	Never-smokers who were highly receptive to tobacco marketing were more than twice as likely to progress to established smoking as were those who were only moderately receptive
Charlton and Blair ⁴⁴ (1989)	2338	12–13	England	Cigarette brand awareness predicted the uptake of smoking in girls but did not reach statistical significance in boys
Charlton et al ⁵⁵ (1997)	1063	12–14	England	Boys who were occasional smokers and named motor racing (sponsored by cigarette manufacturers) as their favorite televised sport had an adjusted OR of 2.25 for progression to regular smoking in comparison with occasional smokers who did not name motor racing as a favorite sport
Choi et al ⁵¹ (2002)	965	12–17	United States	Experimenters who were highly receptive to tobacco marketing were 70% more likely to become established smokers compared with those who were minimally receptive
Health Education Authority ⁴⁶ (1993)	5451	11–15	England	Smokers who were 11–15 y of age were twice as likely as nonsmokers to find the “Reg” ads for Regal cigarettes amusing
López et al ⁴⁵ (2004)	2663	11–15		Smoking increased among 14- to 15-y-old boys only where “Reg” was shown
Pierce et al ³³ (1998)	3664	13–14	Spain	Recognition of billboard cigarette ads predicted the onset of smoking
	1752	12–17	United States	Smoking onset among nonsusceptible never-smokers was predicted by having a favorite cigarette ad (OR: 1.82) or possession of or willingness to use a tobacco promotional item (OR: 2.89)
Sargent et al ⁵³ (2000)	480	8–17	United States	Smoking uptake increased when an adolescent acquired or became willing to use a promotional item
Vaidya et al ⁵⁴ (1999)	5822	13–17	India	After a series of tobacco-sponsored cricket matches, smoking initiation was strongly associated with the belief that smoking makes one a better cricketer
Cross-sectional studies				
Altman et al ²⁵ (1996)	1047	12–17	United States	Awareness of or participation in a cigarette-promotional campaign was associated with a twofold increase in the likelihood of either smoking or being susceptible to smoking
Borzekowski et al ¹³² (1999)	571	13–14	United States	Greater exposure to cigarette ads was correlated with greater susceptibility and with a heightened perception that one had been influenced by advertising
Botvin et al ⁷³ (1993)	602	13–15	United States	Adolescents with high exposure to cigarette advertising in magazines were more likely to be smokers
Braverman and Aaro ¹³³ (2004)	8432	13–15	Norway	Recent exposure to cigarette ads in 5 or more locations (despite a national ban) predicted future smoking intentions and doubled the risk for current smoking
Chen et al ⁵⁹ (2002)	20 332	12–17	United States	There was a consistent dose-response relationship between receptivity to protobacco media and past 30-d smoking with adjusted ORs of 1.38 for white, 1.46 for Hispanic, 1.05 for black, and 1.17 for Asian children
DiFranza et al ¹³⁴ (1991)	1055	12–19	United States	Approval of Joe Camel ads was associated with intention to initiate smoking among nonsmokers
Evans et al ²⁴ (1995)	3536	12–17	United States	Receptivity to promotions among nonsmokers was a greater risk factor for susceptibility (OR: 3.9) than was peer smoking
Feighery et al ³⁶ (1998)	571	13–14	United States	Wanting (OR: 2.25) or owning (OR: 2.32) tobacco promotional materials was associated with susceptibility
Gilpin et al ⁶³ (1997)	7266	12–17	United States	Ownership or willingness to use cigarette-promotional items was higher among smokers and among nonsmokers who were susceptible to smoking
Maassen et al ¹³⁵ (2004)	282	14–18	Gambia	There was no significant correlation between advertising exposure and smoking status
Otake and Shimai ³⁴ (2002)	757	12–13	Japan	Receptivity to advertising increased over the stages of smoking acquisition from precontemplation to contemplation, preparation (experimentation), and action (current smoking)
Sargent et al ²⁷ (1997)	1265	10–19	United States	Ownership of a cigarette-promotional item was associated with susceptibility to smoking, experimental smoking, and current smoking (OR: 4.1)

TABLE 2 Continued

Study	N	Age, y	Location	Outcome
Straub et al ³⁸ (2003)	512	14–15	United States	Among never smokers, intention to smoke was predicted by brand recognition, having a favorite cigarette ad, and willingness to use a tobacco-branded promotional item
Unger et al ³⁵ (1995)	386	13–16	United States	Among never smokers, appreciation of cigarette ads was associated with susceptibility to initiating smoking
Time-series studies				
Pierce et al ⁴⁸ (1994)	102 626	<18	United States	Smoking initiation rates among girls who were <18 y old increased abruptly around 1967, when tobacco advertising that was aimed at selling specific brands to women was introduced
Pierce and Gilpin ⁴⁷ (1995)	165 876	10–17	United States	Historically, smoking initiation rates for male and female adolescents coincided with mass marketing campaigns targeted at each gender

OR indicates odds ratio.

smoking among youth who were aged 10 to 12 years.⁴² In Australia, among young teens who initially were non-smokers, the prevalence rate of smoking 2 years later increased by >15% among those who thought that they had been influenced by advertising, even after adjustment for other risk factors.⁴³ In England, girls who named a brand at baseline were more likely to try smoking by the 4-month follow-up.⁴⁴ In Spain, familiarity with local tobacco billboards increased the likelihood of smoking initiation among 13- to 14-year-olds in a dose-response relationship after controlling for other risk factors.⁴⁵

In England, an increase in the prevalence of youth smoking was observed only in the areas where children were exposed to “Reg” cartoon advertisements.⁴⁶ In the United States, there were gender-specific increases in the initiation of tobacco use by adolescents during historical periods when manufacturers marketed brands to only 1 gender.⁴⁷ Among girls who were younger than 18 years, smoking initiation increased abruptly around 1967, when tobacco advertising was introduced to promote women’s brands.⁴⁸ Similarly, a national youth-oriented promotional campaign for smokeless tobacco by the US Tobacco Company sparked an epidemic of smokeless tobacco use among boys.⁴⁹ For example, in Bogalusa, Louisiana, snuff use by young male adolescents increased by 500% to 800% over 5 years and among 8-year-old white boys doubled to >20%.⁵⁰

Among youth who already had experimented with smoking, those who were receptive to using tobacco promotional items were 70% more likely to progress to regular smoking.⁵¹ Adolescent nonsmokers and early experimenters who owned a tobacco promotional item and named a brand whose advertisements attracted their attention at baseline were more than twice as likely to have become established smokers 4 years later, as compared with those who were not involved with tobacco promotions.⁵² After controlling for factors such as attitudes toward smoking and smoking among peers and family, the likelihood of smoking uptake increased when an adolescent acquired or became willing to use a pro-

motional item and decreased when an adolescent lost a promotional item or became unwilling to use it.⁵³

When a tobacco manufacturer sponsored cricket matches in India, the most influential message conveyed was “you become a better cricketer if you smoke.”⁵⁴ Among nonsmoking youth, belief in this message tripled the risk for smoking initiation after the sponsored cricket series, from 7.5% to 25.5%. There was a dose-response relationship between the number of advertised false beliefs about the benefits of smoking held by the youth and the likelihood of initiation. Boys in England who were fans of tobacco-sponsored auto racing events were twice as likely to become regular smokers as those who did not like racing, and being a fan was a stronger predictor of smoking than smoking by one’s best friend.⁵⁵

Is There a Dose-Response Relationship?

Table 3 summarizes 2 prospective and 7 cross-sectional studies that have demonstrated dose-response relationships between tobacco use by youth and recognition of cigarette ads,^{45,56} appreciation of ads,^{57,58} and belief in the promotional message.⁵⁴ Ethnic groups with the highest receptivity toward tobacco promotion had the highest smoking rates, with a consistent dose-response relationship between receptivity to tobacco promotion and current smoking.⁵⁹ Youth who could recall ads for smokeless tobacco were 7 times more likely to be current users of smokeless tobacco than were youth who could not recall such an ad, with a dose-response relationship between exposure and susceptibility to use, even after controlling for many other risk factors.⁶⁰ The extent to which children have played with candy cigarettes shows a dose-response relationship with subsequent smoking rates.⁶¹

Is the Association Robust?

All of the studies referenced in this section found a reliable positive association between exposure to tobacco promotion and a smoking-related outcome. In a small minority, the effect was limited to 1 gender, consistent with niche marketing (eg, female brands).⁶² The associ-

TABLE 3 Studies That Demonstrated a Dose-Response Relationship

Study (Year)	N	Age, y	Location	Outcome
Prospective studies				
López et al ⁴⁵ (2004)	3664	13–14	Spain	A dose-response relationship was observed between the number of cigarette ads recognized at baseline and rates of smoking initiation during a 2-y follow-up period
Vaidya et al ⁵⁴ (1999)	5822	13–17	India	There was a dose-response relationship between the number of advertised false beliefs about the benefits of smoking held by youth and their likelihood of initiation
Cross-sectional studies				
Choi et al ⁶⁰ (1995)	2814	12–17	United States	Greater recall of smokeless tobacco advertising was strongly correlated with greater susceptibility to use and greater use of smokeless tobacco
Goldstein et al ⁵⁶ (1987)	306	14–19	United States	Increasing levels of tobacco use correlated with increased total ad recognition, with nonsmokers recognizing the fewest ads
Klein et al ⁶¹ (1992)	195	13–14	United States	The more times children had bought candy cigarettes, the more likely they were to have ever tried smoking cigarettes
Maziak et al ⁵⁷ (2003)	7962	12–15	Germany	Adolescents who often appreciated tobacco ads were ~11 times more likely to smoke >10 cigarettes per d than those who did not
Pierce et al ³⁶ (2005)	1451	12–15	United States	The more receptive that never-smokers were to tobacco ads and promotions, the more curious they were about smoking
Santana et al ⁵⁸ (2003)	1701	12–14	Canary Islands	The more that youth approved of tobacco advertising, the more heavily they smoked; never-smokers showed the lowest approval
Sargent et al ³⁷ (2000)	1265	10–19	United States	The more cigarette-promotional items that a youth owned, the greater the chances of being a smoker

ation has been demonstrated in both cross-sectional and prospective studies using a wide variety of measures of both exposure and outcome.

Measures of exposure to various forms of tobacco promotion have included approval or appreciation of advertising[†]; awareness of brand sponsorship activities⁶⁷; ownership of or willingness to use a promotional item[‡]; brand recognition^{38,44,45,56,59,60,70–72}; population exposure to the onset of advertising campaigns^{47,48}; use of candy cigarettes⁶¹; perceived effectiveness of advertising^{43,64}; slogan recognition⁵⁶; and exposure to tobacco advertising in general,^{36,60,64,73,74} magazine advertising,^{74,75} point-of-sale promotions,^{56,76,77} sponsorship of televised sporting events,^{54,78,79} or promotions.^{27,36–38,51,53,61,80}

Outcome measures have included age of smoking onset,⁶⁹ attitudes toward smoking,²² brand-user imagery,⁷⁶ susceptibility to initiation,^{24,41,80,81} intention to use tobacco,^{38,39,56} smoking initiation rate,^{47,48,54} experimentation with smoking,⁷⁸ smoking status,[§] stage of smoking acquisition,³⁴ tobacco use,^{||} and brand preference among smokers.^{77,83,84}

The association has been demonstrated among youth from various cultural and language backgrounds from Australia, the Canary Islands, China, Germany, Great Britain, Hong Kong, India, Japan, Norway, Thailand, Turkey, and the United States. There is no evidence that the association is attributable to confounding. It persists after controlling for sociodemographic characteristics (eg, socioeconomic status, parents' education, parental

attitudes toward smoking),[¶] peer smoking,[#] family members' smoking,^{**} psychological factors (eg, rebelliousness, self-image, depression),^{38,45,52,56,60,75} parenting style,⁶⁵ and knowledge about the health effects of smoking.⁷⁸ Exposure to tobacco promotion was a stronger risk factor for experimentation than was smoking by other family members.⁸¹ Finding cigarette advertisements to be attractive was the strongest risk factor for smoking in a study of Hong Kong adolescents.⁶⁶

A Scientifically Plausible Mechanism

Tobacco promotion has many purposes, 1 of which is to create a positive image of tobacco use in the minds of potential users. According to the Theory of Reasoned Action,⁸⁵ youth use tobacco because they believe that the benefits outweigh the costs. An important function of all advertising is to promote the benefits of using the product. Tobacco marketers present tobacco use as a solution for adolescents' insecurities about their image, appearance, popularity, or maturity.^{9,86} "An adolescent may begin to smoke in order to attain a desirable image both in his own eyes and in the eyes of his peers."⁸⁷ Nonsmoking children who had favorite cigarette ads were more likely to believe the positive imagery about smoking that was created by advertising, and those beliefs predicted an intention to smoke.²² Among nonsmoking children, those who believed that smoking confers popularity were 8 times more likely to express an intention to start smoking in the next year than were children who did not believe this advertising theme.⁸⁷

† Refs 22, 24, 33, 35, 41, 42, 51, 52, 57–59, 61, and 63–66.

‡ Refs 24, 25, 27, 33, 36, 38, 42, 53, 58, 66, 68, and 69.

§ Refs 27, 33, 35, 37, 53, 54, 57, 61, 65, 66, 70, 72, 74, 75, 80, 82, and 83.

|| Refs 22, 25, 36, 42, 43, 45, 52, 55, 56, 59, 60, 64, and 66.

¶ Refs 24, 25, 27, 33, 36–39, 42, 43, 45, 51, 53, 56, 60, 61, 65, 66, 69, 70, 72, 74, 75, and 81.

Refs 24, 27, 33, 36–39, 42, 43, 53, 55, 56, 60, 65, 66, 69, 74, 75, 80, and 81.

** Refs 24, 25, 27, 33, 36–39, 42, 43, 45, 51, 53, 55, 57, 61, 65, 66, 69, 74, 75, and 81.

Compared with nonsmokers, children who smoke believe more commonly in the putative benefits of smoking that are depicted in cigarette advertising.⁸⁸ In the late 1960s, a Virginia Slims advertising campaign, featuring women smoking to rebel against their men, ushered in a surge of smoking among adolescent girls.⁴⁸ Young female adolescents were more likely than male adolescents to find such female-targeted advertising relevant to their self-concepts and to react positively to the images conveyed.⁸⁹

Children's perceptions of the utility of smoking are distorted by promotion. When cigarette ads created a masculine brand-user image, youth volunteered that "looking tough" was their prime reason for smoking. After this type of imagery was banned by the British government, "looking tough" fell to seventh place as a reason that children offered for smoking.⁹⁰ This indicates that the notion that smoking confers masculinity is a creation of promotional strategies, rather than being intrinsic to the act of smoking. Nonsmoking and smoking children who had a favorite cigarette ad were more likely to believe that smoking makes you look tough, makes you look grown up, calms the nerves, controls weight, or gives self-confidence.²² Smoking rates were higher among youth who believed these common advertising claims. The more familiar teenagers are with cigarette advertising slogans, the more likely they are to believe that young people who smoke are more attractive, mature, independent, and popular than nonsmokers.⁹¹ Young adolescents who were conflicted about their own identities were more likely to believe that the images in cigarette ads reminded them of themselves.⁹² Youth might look to the images in cigarette ads to establish their self-concepts.^{92,93}

Another promotional strategy is to provide youth with smoking role models to emulate. The proportion of Indian children who held the false belief that a star cricketer smoked was higher among those who watched matches that were sponsored by a tobacco company. More than half of the children surveyed erroneously believed that at least 1 player on the sponsored cricket team smoked, and 22% believed that at least 4 of these role models smoked.⁷⁸ In 1983, the Brown & Williamson Tobacco Company paid Sylvester Stallone, who starred in teen-oriented action-adventure films, \$500 000 to feature their brands in at least 5 of his movies.⁹⁴ Nonsmoking youth who admired film stars who had smoked in ≥ 3 recent films were 16 times more susceptible to smoking than were youth who admired stars who did not smoke in their films.⁹⁵

Invoking Bandura's social cognitive theory,^{96,97} Hawkins and Hane postulated that tobacco advertising, by depicting smokers' receiving valued rewards such as the attention of the opposite gender, promotes smoking by supplying youth who are experimenting with smoking with vicarious reinforcement for their behavior.⁸⁸ In

support of this theory, Turco⁹⁸ demonstrated under experimental conditions that compared with those who had never smoked youth who had smoked only 1 or 2 cigarettes in their lifetime expressed more positive attitudes toward smoking after exposure to cigarette ads.

Pechmann⁹⁹ proposed a "stereotype priming" model to explain the effect of cigarette promotion on children's attitudes and behaviors regarding tobacco use. Cigarette ads promoted positive stereotypes about smokers, which were enhanced by seeing peers smoke. This, in turn, increased intentions to smoke more than either the ads or peers alone and occurred regardless of whether youth were aware of having seen the ads.¹⁰⁰ This suggests that ads render smoking peers more influential as role models.

Promotion makes children curious about tobacco use while fostering positive user imagery and expectations about the social and psychological utility of use and creating smoking role models. The evidence that we presented demonstrates that promotion changes many children's attitudes about tobacco use from negative to positive and increases their susceptibility and intentions to use tobacco, thereby increasing their likelihood of initiating or of progressing from minimal experimentation to regular use.

No Other Explanation Can Account for the Evidence

The tobacco industry has proposed 3 alternative explanations for the association between exposure to promotion and initiation of tobacco use. (1) Tobacco use causes exposure because users attend more to promotions to justify their behavior to themselves.¹⁰¹ Although users indeed may expose themselves more to promotions,⁹⁸ this does not represent a plausible explanation for the data because it does not account for the fact that familiarity precedes changes in susceptibility among nonsmoking youth, which in turn predicts initiation. (2) Nonsmokers who have favorable attitudes toward tobacco use or greater intentions to use expose themselves to more promotions.¹⁰¹ This also may be true, but it fails to explain why among children who had no intention to use tobacco, those who had the highest exposure to promotions were most likely subsequently to develop such an intention³³ or why children's favorable attitudes about tobacco shift and change in a temporal manner that mirrors the fictional benefits of smoking that are created by promotion. (3) The correlation between tobacco use and media exposure is simply an artifact of other mediating factors.¹⁰¹ The association between exposure to promotion and tobacco use or susceptibility to tobacco use has persisted in every study when adjusted for potentially confounding factors.

DISCUSSION

Following Hill's standards for establishing causality, we applied 6 criteria by which a causal link between expo-

sure to tobacco promotion and the initiation of tobacco use could be judged. The evidence presented in this article meets all 6 criteria. First, children are exposed to tobacco promotion before the initiation of tobacco use. Second, exposure increases the risk for initiation. Third, there is a dose-response relationship, with greater exposure resulting in higher risk. Fourth, the association between exposure and increased risk is robust; it is observed with various study methods, in multiple populations, and with various forms of promotion and persists after controlling for other factors. Fifth, scientifically plausible and theoretically based mechanisms whereby promotion could influence initiation exist. Finally, no explanation other than causality can account for the evidence. We therefore conclude that exposure to promotion causes children to initiate tobacco use.

Several authors, including Boddewyn,⁶ Mizerski,²¹ Moschis,¹⁰¹ Jenkins,¹⁰² Sullum,¹⁰³ McDonald,¹⁰⁴ and Smith,¹⁰⁵ assert that tobacco promotions do not encourage youth to smoke. Sullum¹⁰³ argued that even if promotions harm children, they should be not be restricted. A search of tobacco industry documents reveals that each of the authors who have disagreed with our conclusion has worked closely with the tobacco industry.^{21,105-111}

The industry has long pursued a political strategy of commissioning third-party surrogates who submit their work to scientific journals without disclosing their conflict of interest.^{112,113} For example, an article by Jenkins, asserting that tobacco promotion has no effect on children, appeared in the *International Journal of Advertising* without mention that the report was planned and funded by the Canadian Tobacco Manufacturers' Council.^{102,107} Industry efforts to manipulate the literature have created an illusion of scientific controversy where none exists. This has been true also concerning the issue of environmental tobacco smoke and the economics of banning smoking in restaurants and bars. When research has been funded by the tobacco industry, the outcome typically is biased strongly in favor of the industry's positions.^{114,115}

In regard to research concerning the toxic effects of secondhand smoke, it has been alleged that the tobacco industry uses "sophisticated public relations campaigns" to "shape the standards of scientific proof to make it impossible to 'prove' that secondhand smoke—among many other environmental toxins—is dangerous."¹¹³ Using a parallel strategy, tobacco industry consultants assert that the standard by which the effect of tobacco promotions is to be judged is their impact on per capita consumption. They argue that because restrictions on tobacco promotion do not consistently produce an immediate reduction in per capita tobacco consumption, such promotion has no adverse impact on public health.^{103,106} However, children who are between 8 and 17 years of age consume only an estimated 4% of all

tobacco.¹¹⁶⁻¹¹⁸ Therefore, a ban on tobacco promotion, even if it resulted in an immediate and substantial reduction in existing smokers in this age range, would have only a tiny immediate impact on total cigarette consumption. Likewise, a ban on tobacco promotion would not eliminate existing underage smokers; it likely would reduce only the number of new smokers. Because youth take an average of 2 years to progress from their first puff to smoking as much as a single cigarette per day,¹¹⁹ a reduction in the number of new smokers would have a negligible impact for several years on the quantity of tobacco smoked by youth. Therefore, protecting children from tobacco promotion, which ultimately might have enormous long-term public health benefits, would have no measurable impact on total tobacco consumption for many years. Given the multiplicity of economic and social factors that influence cigarette sales, aggregate sales data cannot possibly exclude tobacco promotion as an important contributor to the uptake of tobacco use by children.

Ethical considerations limit the type of research that can be performed to evaluate the impact of tobacco promotions on children. Experimental studies are rare, and the evaluation of exposure often is indirect. Errors of misclassification of exposure status would work to minimize the observed association between exposure and outcome, hiding the impact of tobacco promotions. Because exposure to tobacco promotions is almost universal among children, no study has incorporated a truly unexposed control group. Studies that compare only intensity of exposure within a universally exposed population likely will underestimate the full impact of tobacco promotions. Conversely, the strength of the evidence reviewed here may be overestimated if there is a bias against the publication of negative studies.¹²⁰

As the harm to children that is engendered by tobacco advertising has become apparent, legal restrictions have been imposed. Each such restriction has been countered by industry's remarkable agility. For example, after the 1971 ban on cigarette commercials on broadcast media, tobacco companies shifted their advertising dollars to the sponsorship of televised sporting events, thereby vitiating the ban.¹²¹ In 1 broadcast of the Marlboro Grand Prix, the Marlboro name or logo appeared 5933 times and was visible during 49% of the 93-minute broadcast.¹²² Tobacco companies also began paying television producers and actors to use their products in prime-time programming.¹²³ In addition, the companies increased their advertising in youth-oriented magazines.¹²⁴ In 1998, the Master Settlement Agreement between the tobacco industry and 46 US states banned advertising in such magazines.¹²⁵ The industry responded by preferentially placing their ads in magazines with the next highest levels of youth readership.¹²⁶ A Massachusetts Department of Public Health study that was conducted in 2002 found that after the Master Settlement Agreement, the

US Tobacco Company paid an average of \$5 million per year to advertise its brands in magazines whose youth readership exceeded 20%; those magazines reached >2 million readers between 12 and 17 years of age.¹²⁷

The United States has signed but not yet ratified (as of March 31, 2006) the World Health Organization's Framework Convention on Tobacco Control, the world's first tobacco control treaty.¹²⁸ It took effect on February 17, 2005, and requires nations that sign and ratify the treaty to ban tobacco advertising to the degree allowed by their respective constitutions. In 1980, the US Supreme Court established standards for the regulation of commercial speech. Restrictions on commercial speech can be justified when (1) advertisements promote illegal activity or are false, deceptive, or misleading; (2) the government has a substantial interest in regulating speech; (3) regulation would directly advance the government's interest; and (4) the restrictions imposed are no more extensive than necessary.¹²⁹ Tobacco promotion clearly deceives children regarding the benefits that they will derive from using tobacco. The literature provides strong and consistent scientific evidence that tobacco promotion causes children to smoke. As government has a substantial interest in protecting children from premature death that is caused by tobacco use, a ban on tobacco promotion is a logical step toward that goal. Given the tobacco industry's long history of successfully targeting youth despite partial restrictions,⁸⁶ a complete ban seems to be the least restrictive regulation necessary to protect children from the serious harm that is engendered by exposure to tobacco promotion.

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Tobacco Promotion and the Initiation of Tobacco Use: Assessing the Evidence for Causality

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