Available online at www.sciencedirect.com
ScienceDirect
Preventive Medicine xx (2007) xxx–xxx
Preventive Medicine
www.elsevier.com/locate/ypmed

R-rated film viewing and adolescent smoking

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Abstract

Objectives. As smoking is very common in R-rated films, we sought to determine if viewing R-rated films is associated with adolescent smoking.

Methods. Three annual cross-sectional surveys conducted of 88,505 Year 10 students of largely European, Maori, Asian or Pacific Islander ethnicity in secondary schools in New Zealand between 2002 and 2004. Outcomes of interest were: intention to smoke among never smokers; past experimentation with smoking among current non-smokers; current smoking status; and current frequency of smoking.

Results. Dose–response relationships were observed between the frequency of viewing R-rated films and all outcome measures controlling for age, gender, ethnicity, peer smoking, parental smoking, socioeconomic status, pocket money and household smoking rules. Compared to never viewing R-rated films, viewing at least weekly nearly tripled the relative risk (2.81; 95% confidence interval 2.57, 3.09) of never smokers being susceptible to smoking, and more than doubled the risk of both past experimentation (2.28; 95% CI 2.12, 2.45) and smoking ≥ monthly (2.31; 95% CI 2.10, 2.54). Each of these risks was seen across all ethnic groups.

Conclusions. Our results extend the association that has been demonstrated between viewing R-rated films and current smoking in American youth by demonstrating the same association in youth of different ethnic and cultural backgrounds in New Zealand.

Keywords: Smoking; Adolescent; Intention; Motion pictures

Most people who begin to smoke cigarettes do so during early to mid-adolescence and almost all first use of tobacco occurs before age 18 (Johnston et al., 2006; USDHHS, 1994). This is an especially serious public health problem because the younger one begins to smoke the more likely one is to become addicted (Chen and Millar, 1998), and the greater the risk one faces of contracting the myriad diseases caused by smoking (USDHHS, 2004). Many psychological and sociocultural factors have been implicated in influencing adolescents to begin smoking, including trait anxiety (DiFranza et al., 2004; Patton et al., 1998), attention deficit disorder (Milberger et al., 1997), depressed mood (Audrain-McGovern et al., 2006), a poor connection with family, school or community (Kaufman et al., 2002; Krohn et al., 1986), exposure to parents, siblings and peers who smoke or approve of smoking (Farkas et al., 2000; Wills et al., 2004) and exposure to cigarette marketing (DiFranza et al., 2006; Wellman et al., 2006; Henriksen et al., 2004).

Exposure to smoking in films is an additional risk factor. Several studies have found that the odds of having tried smoking increase significantly when youth see smoking in films or on television, with odds ratios (ORs) varying between 1.27 and 5.43 (Henriksen et al., 2004; Sargent et al., 2001; Unger et al., 2001). Sargent et al. (2005) demonstrated a dose–response relationship between movie exposure and having tried smoking in a large representative sample of US adolescents. Compared to youth in the first quartile of exposure, the ORs for youth in the second, third and fourth quartiles were 1.7, 2.2 and 2.6, respectively, after controlling for psychological and social factors. In addition, exposure to movie smoking increased never smokers' intentions to smoke and favorable attitudes toward smoking (Pechmann and Shih, 1999; Sargent et al., 2002). Most importantly, in a prospective study of over 3500 adolescents, approximately half of smoking initiation

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0091-7435/$ - see front matter © 2007 Elsevier Inc. All rights reserved.
doi:10.1016/j.ypmed.2007.07.025

was attributed to exposure to smoking in movies (Dalton et al., 2003).

A review of the top 50 commercially available US films revealed that smoking in R-rated films increased between 1991 and 2000 (Mekemson et al., 2004). Films rated "R" contain material that is intended for viewing only by older teens and adults. Cinemas in the US are supposed to deny entry to R-rated movies to unaccompanied children under 17 years of age, and parents are advised not to allow children under 17 to watch R-rated movies (MPAA, 2006). In New Zealand, the rating typically denotes restriction to those 16 and over, or 18 and over, as determined by the Office of Film and Literature Classification (Movie Ratings Network, 2006). Adolescents whose parents restrict their viewing of R-rated films are significantly less likely to smoke than are their peers without such restrictions (Dalton et al., 2002, 2006; Thompson and Gunther, 2007). In one study, viewing R-rated movies increased the risk of smoking in whites but not blacks in the U.S. (Jackson et al., 2007). We undertook this study to determine if watching R-rated movies is associated with smoking among adolescents of different cultural and ethnic backgrounds in New Zealand.

Methods

Sample selection

Since 1999, annual surveys have been conducted to assess cigarette smoking by Year 10 students in New Zealand (Scragg, 2005). This paper reports data from the 2002–2004 surveys. Each year, all New Zealand schools were invited to administer a two-page questionnaire to Year 10 students in November. The proportion of schools that participated were 67.3% in 2002 (n=309), 66.1% in 2003 (n=312), and 64.7% in 2004 (n=319). A total of 99,063 (70.4%) out of 140,721 students enrolled in participating schools completed questionnaires (30,972 in 2002; 34,812 in 2003; 33,279 in 2004). The data are a convenience sample and do not represent a weighted national population. The Ministry of Education classification of schools by socioeconomic decile from 1 (low) to 10 (high) was used to code socioeconomic status (SES) (NZ Ministry of Education, 2006).

Table 1
Frequency of watching all movies as a function of demographic characteristics – New Zealand, 2002–2004

	N	Frequency per month of watching all movies (%[a])						
		>9	8–9	7–7.5	5.5–6.5	4–5	<4	P[b]
Age (years)	88,508							
14	45,704	15.4	19.6	26.4	18.3	13.1	7.2	<0.0001
15	42,804	14.9	18.8	25.9	18.5	13.7	8.2	
Gender								
Male	42,943	15.8	18.9	25.9	18.2	13.6	7.6	<0.0001
Female	45,565	14.5	19.5	26.4	18.6	13.2	7.8	
Ethnicity								
Maori	15,202	24.5	25.1	24.3	12.8	8.3	5.0	<0.0001
Pacific Islander	5824	28.4	22.6	22.4	11.8	9.1	5.7	
NZEO	59,389	11.7	17.8	27.6	20.5	14.6	7.8	
Asian	8093	12.9	16.0	22.4	18.5	17.0	13.2	
SES decile								
1–2 (low)	7778	24.1	22.7	22.5	14.6	10.4	5.8	<0.0001
3–4	14,724	18.3	20.9	25.7	16.4	12.0	6.7	
5–6	21,074	14.5	19.2	26.7	18.6	13.3	7.6	
7–8	22,709	12.7	18.0	27.3	19.7	14.4	7.9	
9–10	22,223	13.1	18.0	26.2	19.5	14.4	8.8	

NZEO=New Zealand European and Others. SES=socioeconomic status.
[a] Row percent.
[b] From chi-square test; variance estimated using Taylor series.

Table 2
Frequency of watching R-rated movies as a function of demographic characteristics – New Zealand, 2002–2004

	N	Frequency of watching R-rated movies (%[a])					
		Weekly	2–3 times a month	Once a month	Less often	Never	P[b]
Age (years)	88,505						
14	45,712	37.7	25.8	14.2	16.5	5.8	<0.0001
15	42,793	39.4	25.9	13.6	14.9	6.2	
Gender							
Male	43,256	44.9	23.8	12.5	13.6	5.3	<0.0001
Female	45,249	32.5	27.8	15.3	17.8	6.7	
Ethnicity							
Maori	15,264	52.4	22.6	9.5	10.7	4.8	<0.0001
Pacific Islander	5806	41.2	20.8	10.1	16.1	11.9	
NZEO	59,510	36.8	28.2	15.4	15.5	4.2	
Asian	7925	23.4	17.8	14.3	27.2	17.2	
SES decile							
1–2 (low)	7804	46.2	20.7	10.1	13.9	9.2	<0.0001
3–4	14,713	43.1	23.6	11.9	14.4	7.1	
5–6	21,057	40.5	26.5	13.6	14.3	5.1	
7–8	22,744	38.6	27.2	14.5	15.2	4.4	
9–10	22,187	30.9	26.9	16.3	19.3	6.6	

NZEO=New Zealand European and Others. SES=socioeconomic status.
[a] Row percent.
[b] From chi-square test; variance estimated using Taylor series.

Survey administration

The Ethics Committee of the Ministry of Health in Auckland granted a waiver of the formal review and consenting processes. We obtained permission from school principals to allow teachers to proctor the anonymous self-administered questionnaires in class. To maintain confidentiality, teachers did not examine the surveys for completeness.

Survey content

Subjects answered questions about their demographic characteristics (age, sex and self-assigned ethnicity). In addition, the survey assessed whether the participant had ever smoked a cigarette (even just a few puffs). Those who answered "no" were classified as never smokers. Those who answered "yes" were queried about the frequency of their current smoking (*at least once a day*, *at least once a week*, *at least once a month*, *less often*, *never*). Susceptibility to future smoking was assessed by asking "Do you think you will smoke a cigarette at any time during the next year?" Respondents were classified as non-susceptible only if they answered 'definitely not'. Additional items assessed peer smoking, pocket money, parental smoking status and smoking within the home.

Subjects were asked how often they watched movies in three venues: at the cinema, on a hired video, and on television. The frequency of viewing on each venue was scored (once a week or more often=4; 2 to 3 times a month=2.5; about once a month=1; less often=0.5; never=0) and summed across the three venues to determine the frequency of general movie viewing. Subjects were also asked how frequently they watched R-rated movies in the three venues, and these responses were scored in the same way.

Statistical analysis

There were 96,156 respondents aged 14 and 15 years in the total sample (2002: n=30,096, 2003: n=33,661, 2004: n=32,399). Respondents were excluded if data were missing on gender (268), ethnicity (971), SES (622), or smoking status (779), leaving 93,516 available for analyses. Subjects were

Please cite this article as: Laugesen, M., et al., R-rated film viewing and adolescent smoking, Prev. Med. (2007), doi:10.1016/j.ypmed.2007.07.025

Table 3
Relative risk of a never smoker being susceptible to smoking a cigarette during the next year – New Zealand, 2002–2004

	Susceptible to smoking during the next year			
	Yes	No	Total	RR (95% CI)[a]
Frequency of watching all movies (per month)				
>9.0	1503 (36.9%)[b]	2568	4071	1.58 (1.46, 1.71)
8.0 to 9.0	2227 (36.3%)	3906	6133	1.51 (1.41, 1.61)
7.0 to 7.5	3470 (36.6%)	6012	9482	1.48 (1.40, 1.58)
5.5 to 6.5	2693 (34.9%)	5017	7710	1.42 (1.32, 1.51)
4.0 to 5.0	1895 (29.6%)	4508	6403	1.21 (1.13, 1.30)
<4.0	955 (23.8%)	3052	4007	1.00
Frequency of watching R-rated movies				
Weekly	3897 (39.2%)	6050	9947	2.81 (2.57, 3.09)
2–3 times a month	3609 (40.8%)	5230	8839	2.82 (2.58, 3.09)
Once a month	2316 (37.1%)	3930	6246	2.55 (2.32, 2.81)
Less often	2419 (26.8%)	6619	9038	1.87 (1.71, 2.04)
Never	473 (13.3%)	3077	3550	1.00

RR = relative risk. CI = confidence interval.
[a] Adjusted for age, gender, and ethnicity.
[b] Row percents.

excluded from specific analyses if they had missing information on R-rated movie status (5011) or total movie status (5008).

Analyses were conducted using SUDAAN version 9.0.0 which corrects the standard errors for design effects arising from clustering by school (SUDAAN). The CROSSTAB procedure was used to calculate percentages and adjusted Mantel Haenszel relative risks (RR), and the MULTILOG procedure was used to calculate adjusted odds ratios (OR) while adjusting for age, gender, ethnicity and SES. Additional logistic regressions were conducted to control for peer smoking, pocket money, parental smoking and whether smoking was allowed in the home. These last analyses were limited to the 2002 and 2003 surveys because the response categories for pocket money were changed in 2004. A p-value of 0.05 was used as the test of statistical significance.

Results

Subjects

About half the subjects were 14 years old (51.6%) and half were female (51.1%). Subjects were: primarily of European ethnicity (67.2%, including 1417 who self-identified as "other"), followed by Maori (17.2%), Asian (9%) and Pacific Islander (6.5%). Subjects were largely of moderate to high SES, 8% were in deciles 1 and 2 (low), 16.6% in deciles 3 and 4, 23.8% in deciles 5 and 6, 25.7% in deciles 7 and 8, and 25.1% in deciles 9 and 10. Never smokers comprised 42.8% of the subjects, while 27.7% had smoked previously but were not current smokers.

Frequency of viewing R-rated movies

The frequency of watching all movies and R-rated movies varied as functions of demographic characteristics (Tables 1 and 2). More males (81.2%) than females (75.6%), and more Maori (84.5%) and Europeans (80.4%) than Pacific Islanders (72.1%) or Asians (55.5%) watched R-rated movies at least once a month. Weekly viewing increased linearly with decreasing SES level.

Relationships between viewing R-rated movies and smoking

Among never smokers there was a dose–response relationship between frequency of watching R-rated movies and susceptibility to smoking among each of the four ethnic groups (Table 3; Fig. 1). With all ethnic groups combined, any viewing of R-rated films was associated with a nearly doubled risk of being susceptible, rising to a nearly trebled risk with weekly viewing, adjusting for

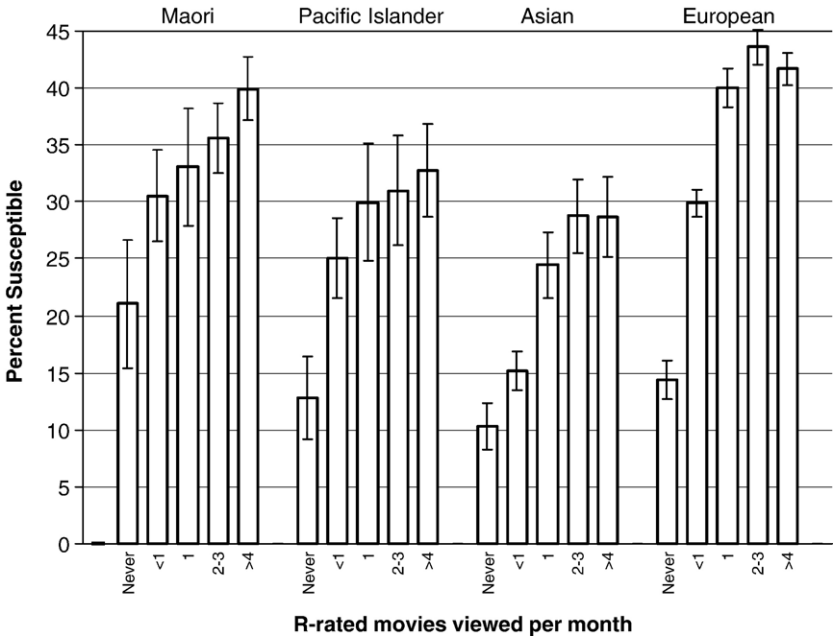

Fig. 1. Susceptibility to smoking among never-smokers as a function of the frequency of viewing R-rated movies and ethnicity – New Zealand, 2002–2004. Compared to no exposure, all exposures result in a statistically significant increase in risk within each ethnic group when adjusted for age and sex ($p < 0.05$, $n = 3669$ Maori; 2509 Pacific Islander; 6139 Asian; 27,614 European).

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Table 4
Relative risk of a student who is not currently smoking having ever experimented with cigarettes – New Zealand, 2002–2004

	Experimented with smoking a cigarette			
	Yes	No	Total	RR (95% CI)[a]
Frequency of watching all movies (per month)				
>9.0	3934 (48.8%)[b]	4124	8058	1.75 (1.66, 1.85)
8.0 to 9.0	5140 (45.4%)	6178	11,318	1.67 (1.58, 1.76)
7.0 to 7.5	6812 (41.6%)	9546	16,358	1.56 (1.48, 1.64)
5.5 to 6.5	4415 (36.3%)	7760	12,175	1.39 (1.32, 1.46)
4.0 to 5.0	2874 (30.9%)	6432	9306	1.21 (1.14, 1.27)
<4.0	1341 (24.9%)	4044	5385	1.00
Frequency of watching R-rated movies				
Weekly	10,454 (51.0%)[b]	10,032	20,486	2.28 (2.12, 2.45)
2–3 times a month	6980 (43.9%)	8907	15,887	2.04 (1.90, 2.18)
Once a month	3354 (34.8%)	6294	9648	1.67 (1.55, 1.80)
Less often	2854 (23.9%)	9087	11,941	1.20 (1.12, 1.28)
Never	878 (19.7%)	3582	4460	1.00

RR = relative risk. CI = confidence interval.
[a] Adjusted for age, gender and ethnicity.
[b] Row percents.

age, gender and ethnicity. Among subjects who were not currently smoking there was a dose–response relationship between R-rated film exposure and past experimentation with smoking (Table 4); the risk was 20% greater with any viewing and over twice as great with weekly viewing adjusting for all demographic variables. A dose–response relationship was seen within each ethnic group (data not shown). When controlled for age, gender and ethnicity, the viewing of R-rated films showed a dose–response relationship with the risk of smoking at least once a month among current smokers in each ethnic group (Table 5).

Logistic regression analyses showed that adding school SES decile to a model with age, sex and ethnicity had little effect on odds ratios for the 3 outcome variables in Tables 3–5, indicating that the effects of movie watching are also independent of SES decile (data not shown). Adjusting for peer smoking, pocket money, parental smoking and household smoking rules increased the odds ratios of susceptibility and experimentation for all exposure levels of viewing all movies and viewing R-rated films. Adjustment for these factors slightly attenuated the odds ratios for monthly smoking associated with viewing all movies (from an odds ratio of 1.72 to 1.63 for the highest exposure) and for R-rated movie viewing (from 2.31 to 2.25 for the highest exposure), but did not change the statistical significance of any result.

Discussion

In this cross-sectional study, exposure to R-rated movies was associated with increased susceptibility to smoking among non-smokers, increased likelihood of prior experimentation with cigarettes, and increased risk of current tobacco use in each of four ethnic groups. Our data extend this association to a population outside of the U.S. where many of these films are produced.

Our data demonstrate that among never-smokers, R-rated movie viewing shows a dose–response relationship with susceptibility to smoking. This confirms previous reports in which exposure to movie smoking was associated with increased intentions to smoke among never smokers (Pechmann and Shih, 1999; Sargent et al., 2002). The association of R-rated film viewing with predictors of future smoking makes it implausible that the association between R-rated film-viewing and smoking results from the act of smoking causing an increase in movie viewing.

Strengths of this study include its large, multi-ethnic sample, and the establishment of movie viewing as a risk factor for smoking in a culture outside of the U.S. where most prior studies have been conducted. We were able to control for demographics, peer smoking, parental smoking, household smoking rules and available spending money. Sargent et al. (2005) have demonstrated that the association between movie viewing and smoking persists after controlling for a wide range of potential psychosocial confounders including rebelliousness, risk taking and parenting styles. Several limitations of the study prevent us from concluding, based on our data alone, that R-rated movie viewing causes youth to smoke. Data were not available to evaluate the potential role of factors such as thrill seeking, rebelliousness or parenting practices that might influence both smoking and movie viewing. We relied on self-reports to determine movie exposure and had no direct measure of the movie content. Sargent et al. (2001, p. 4) analyzed movie content and concluded "a typical adolescent watching 150 films a year will be exposed to about 800 depictions of smoking." We are unable to evaluate the impact of smoking in non R-rated movies, but others have shown that watching Parental Guidance-13 movies increases the risk of smoking (Gale et al., 2006). A dose–response relationship is one of the Hill (1965) criteria for demonstrating causality. While the dose–response relationship observed in this study adds evidence for the case for causality, a cross-sectional study such as this cannot, by itself, prove causality.

What mechanism might account for the association between watching R-rated films and the risk of smoking? Smoking in the 10 highest grossing films in New Zealand in 2003, whether R-rated

Table 5
Relative risk of a student smoking monthly or more often – New Zealand, 2002–2004

	Smoked monthly or more often			
	Yes	No	Total	RR (95% CI)[a]
Frequency of watching all movies (per month)				
>9.0	3832 (28.6%)[b]	9570	13,402	1.72 (1.61, 1.84)
8.0 to 9.0	3861 (22.7%)	13,115	16,976	1.39 (1.30, 1.49)
7.0 to 7.5	4487 (19.4%)	18,688	23,175	1.26 (1.18, 1.35)
5.5 to 6.5	2603 (16.0%)	13,684	16,287	1.09 (1.02, 1.17)
4.0 to 5.0	1622 (13.7%)	10,242	11,864	0.97 (0.90, 1.04)
<4.0	962 (14.1%)	5842	6804	1.00
Frequency of watching R-rated movies				
Weekly	9652 (28.3%)[b]	24,460	34,112	2.31 (2.10, 2.54)
2–3 times a month	4434 (19.4%)	18,410	22,844	1.59 (1.44, 1.75)
Once a month	1605 (13.0%)	10,714	12,319	1.15 (1.05, 1.26)
Less often	1209 (8.7%)	12,718	13,927	0.80 (0.73, 0.88)
Never	598 (11.3%)	4705	5303	1.00

RR = relative risk. CI = confidence interval.
[a] Adjusted for age, gender and ethnicity.
[b] Row percents.

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or not, was typically associated with positive character traits, particularly rebellion (Gale et al., 2006). In a study of 12- and 16-year-old New Zealand adolescents, McCool et al. (2005) found that exposure to smoking in movies was associated with higher levels of perceived smoking prevalence among teens, greater perceived acceptability of smoking, and greater expectations of benefit from smoking. Films provide impressionable youth with the opportunity to see their movie idols smoke in a manner that makes it very appealing.

Watching R-rated movies more than once per month was associated with a doubling of the likelihood that a youth had experimented with smoking. To reduce youth exposure to smoking in film, public health groups have called for movies that depict smoking to be rated R (Smoke Free Movies website, 2007). As R-rated movies have a smaller potential audience than movies rated for younger age groups, if the rating system was stringent movie producers would have a financial incentive to remove smoking from PG and G rated films, but not from R-rated films. As we find that 94% of the 14–15 year olds in our sample watched R-rated movies, and 38.5% did so on a weekly basis, limiting smoking to R-rated movies will not eliminate the influence of smoking in the movies. Another approach is to mandate the appearance of health warnings to precede films that include smoking at cinemas, on rentals, and broadcasts (Edwards et al., 2007). More research is needed to determine if such counter-advertising might help to mitigate the adverse impact of movie viewing.

Acknowledgments

The survey was carried out by Action on Smoking and Health (ASH). Funding was provided by the New Zealand Ministry of Health.

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Please cite this article as: Laugesen, M., et al., R-rated film viewing and adolescent smoking, Prev. Med. (2007), doi:10.1016/j.ypmed.2007.07.025