RESEARCH PAPER

The ID effect on youth access to cigarettes

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Objective: To estimate the effect on cigarette sales rates when minors present identification (ID).
Design: Controlled experiment in which minors attempting to purchase cigarettes either carried a valid photo ID (documenting they were minors) or carried no ID, and were instructed to show the ID or admit having no ID if the clerk requested proof of age.
Setting: Census of retail stores in six urban and suburban Colorado counties.
Subjects: Retail cigarette clerks, uninformed of the study.
Main outcome measures: Relative risk (RR) of cigarette sale to a minor when ID was requested and presented versus requested but not presented.
Results: When clerks requested ID, sales were more than six times as frequent if minors presented ID than if they did not (12.2% *v* 2.0%, RR 6.2, $p < 0.0001$). The relative risk remained substantially unchanged under adjustment for demographic and circumstantial covariates.
Conclusions: Presentation of photo ID in compliance checks increases illegal cigarette sales to minors. The impact may vary among states or locales and depends strongly on how often clerks request proof of age. Clerk training and responsible cigarette sales practices should include age calculations from photo ID. Programmes relying on investigative purchase attempts to estimate actual rates of cigarette sales to minors should ascertain and replicate local ID presenting behaviours that minors typically use during genuine attempts to buy cigarettes.

At least 80 nations prohibit cigarette sales to children and adolescents[1 2]; the minimum purchase age ranges from 15–21 years. Merchant compliance with these laws is often evaluated through surveys in which supervised minors attempt to purchase cigarettes. Such compliance checks have been used extensively for at least 15 years[3] in the USA,[4 5] Canada,[6 7] Mexico,[8 9] the UK,[10 11] Thailand,[12] Australia,[13–15] Japan,[16] South Africa,[17] and presumably elsewhere.

The usual objective of compliance checks is estimation of actual tobacco sales to underage buyers in a defined area. Results may be used to guide public health programming, or to assess needs and build support for enforcement. In the USA, results of compliance checks are also considered in awarding federal grant funds to states and territories for prevention and treatment of alcohol and substance abuse.

Despite the importance of accurate and reliable estimates, protocols vary widely in ways that can bias the outcome. Influential elements include the investigative minor's sex, ethnicity, chronological or perceived age; the clerk's age, sex, ethnicity; time of day, day of the week when checks are conducted; availability of self service product displays; and minors' appearance and behaviour during purchase attempts.[4 18–29] Among these factors, the most controllable are minors' demographic characteristics, appearance, and behaviour, as well as compliance check timing. In contrast, clerk characteristics and self service displays are determined by merchant practices rather than surveillance protocols (except where governments have banned self service tobacco displays or set minimum tobacco clerk ages).[30]

Protocols typically specify whether minors must look their age or may strive to look older; whether they will admit their true age or lie; and whether they carry proof-of-age identification (ID). The use versus non-use of ID was one of several protocol factors tested simultaneously in a small study[20] using a convenience sample of outlets. In that study, the only minor who carried ID completed 41.7% of purchase attempts (5/12) compared to 3.2% (4/126) completed by four minors who did not carry ID but otherwise used similar "smoker" purchase attempt protocols. Further research is needed into the potential impact of showing a photo ID on estimates of compliance with laws prohibiting cigarette sales to minors.[29] In the current report, we present results of experimental use of photo ID in a large number of urban and suburban tobacco outlets in Colorado.

METHODS

Protocol

The Colorado Tobacco Enforcement Unit (CTEU) recruited 16 minors and supervised their attempts to buy cigarettes once from each retail outlet accessible to minors across six urban and suburban counties near Denver between March and October 2001; bars, private clubs, and adult entertainment businesses were excluded (final n = 1269). Minors were non-smokers and were trained by CTEU investigators; most had previous investigative purchase experience. The CTEU obtained standard issue photo IDs with the minors' true names, birth dates, and photographs. (Colorado ID cards state the bearer is younger than 21 years.) CTEU investigators systematically varied minors' carrying of ID into stores, alternating by purchase attempt or by time of day (for example, the minor carried ID every other purchase attempt, or the minor carried ID in the morning but not the afternoon of the same day). We used this simple systematic assignment method, rather than true random assignment, to minimise investigator burden while still having each minor serve as his/her own control. At an outlet, the investigator pretended to shop while the minor entered separately and attempted the purchase. When carrying ID, minors were instructed to present it only if clerks asked for it; when not carrying ID, they were instructed to say they had none if asked for it. They did not wear makeup and were told not to lie about their age; males were clean shaven.

Analyses

Four minors who were enrolled in the study did not have their ID condition varied. Data from their purchase attempts, roughly 14.7% of total attempts, are excluded from this report. The comparability of assigned ID conditions (ID *v* no ID) was assessed on demographic and timing factors using Fisher's

Table 1 Investigative minors and their cigarette purchase attempts, by sex and age

	Minors n (%)	Attempts n (%)
Total	12 (100.0)	1083 (100.0)
Sex		
Male	10 (83.3)	937 (86.5)
Female	2 (16.7)	146 (13.5)
Age (years)		
14	2 (16.7)	182 (16.8)
15	4 (33.3)	499 (46.1)
16	3.5* (29.2)	199 (18.4)
17	2.5* (20.8)	203 (18.7)

*Minor's birthday occurred midway during study.

Table 2 Purchase attempt circumstances

	n (%)
Total	1083 (100.0)
Day of week	
Saturday	740 (68.3)
Sunday	72 (6.7)
Monday–Friday	271 (25.0)
Time of day*	
8.00–9.59 am	168 (15.5)
10.00–11.59 am	353 (32.6)
12.00–1.59 pm	199 (16.4)
2.00–3.59 pm	186 (25.5)
4.00–5.40 pm	86 (8.0)
Clerk sex*	
Female	582 (53.8)
Male	500 (46.2)
Perceived clerk age (years)*	
<30	339 (31.3)
30–50	517 (47.8)
>50	226 (20.9)

*Data missing for one observation.

exact or Pearson's χ^2 for categorical variables and a non-parametric rank score test (Kruskal-Wallis χ^2) for equality of time-of-day distributions, which were non-normal. Pearson's χ^2, Mantel-Haenszel χ^2 for trends, and univariate logistic regression were used to assess the impact on sales of potential covariates. Relative risks (risk ratios) were computed in the usual way. Standardised sales rates were computed for the two ID conditions using covariate distributions in the sample. Multivariate logistic regression was used to assess the importance of confounding factors, and sales rates were predicted under hypothetical scenarios of interest based on the fitted model.

RESULTS

Descriptive statistics

Ten minors were male, and males made 86.5% of purchase attempts (table 1). The mean age was 15.4 years for minors and for purchase attempts. Two thirds of purchase attempts occurred on Saturday (table 2), and most others were conducted on one of four weekdays. The median time of day was 12:13 pm. Slightly more clerks were female than male, and minors perceived clerks to be younger than 30 years about one third of the time (table 2).

Comparability of ID conditions

ID was carried in 50.0% of purchase attempts. Most attempt circumstances (minor age, clerk sex, perceived clerk age, rate of clerk requests for ID, and day of the week) were not significantly different across ID assignments (table 3). ID was carried significantly more often by female minors, in the afternoon, and in one county as well as less often in another county. (These differences arose when investigators varied the ID condition by morning versus afternoon, and they are addressed in the analysis.)

Table 3 Characteristics of ID conditions for purchase attempts

	No ID n (%)	ID n (%)
Total	541 (50.0)	542 (50.0)
Sex of minor		
Male	488 (52.1)	449 (47.9)
Female	53 (36.3)	93 (63.7)**
Age of minor (years)		
14	82 (45.0)	100 (55.0)
15	262 (52.5)	237 (47.5)
16	90 (45.2)	109 (54.8)
17	107 (52.7)	96 (47.3)
Day of week		
Saturday	369 (49.9)	371 (50.1)
Sunday	34 (47.2)	38 (52.8)
Weekday	138 (50.9)	133 (49.1)
Median time of day	11.30 am	12.45 pm†
Age of clerk (years)		
<30	162 (47.8)	177 (52.2)
30–50	271 (52.4)	246 (47.6)
>50	107 (47.4)	119 (52.6)
Sex of clerk		
Female	283 (48.6)	299 (51.4)
Male	257 (51.4)	243 (48.6)
Clerk asked to see ID‡		
Yes	462 (49.2)	477 (50.8)
No	75 (54.4)	63 (45.6)

**p<0.001.
†Kruskal-Wallis χ^2=12.5, p=0.0001.
‡Data missing for six observations.

Assessment of potential covariates

In attempts where clerks asked for proof of age (n = 939, 87.2% of total attempts)—that is, where carrying ID could influence the outcome—sales occurred more often in the afternoon, to minors aged 17 and to males, and less often on Saturday and to minors aged 14 (table 4). Sales did not differ significantly by clerk age or sex.

Outcomes

The overall sales rate was 12.7% (95% confidence interval (CI) 10.8% to 14.7%). Clerks requested ID in 87.2% of purchase attempts. When they did not ask for ID, minors completed seven times more sales (51.5% *v* 7.1%; relative risk (RR) 7.2, $p < 0.0001$).

When clerks did request proof of age, ID presentation increased sales more than sixfold (12.2% *v* 1.9%; RR 6.2, $p < 0.0001$). The effect was slightly larger (12.6% *v* 1.8%; Mantel-Haenszel RR 7.3) when standardised between ID conditions for significant covariates (morning versus afternoon, ages 14 and 17 years, sex, and Saturday attempts). The effect was observed for 10 of the 12 minors (table 5).

To assess confounding by minors' sex and time of day, we estimated a logistic model of sale and ID condition with these two covariates, using cases where clerks requested proof of age. The odds ratio (OR) of sale for carrying ID was slightly larger with the covariates than with the ID condition alone (7.4 *v* 7.0, NS). We also modelled sale on ID condition plus covariates whose coefficients remained significant in the presence of others (sex of minor and age 17 years; clerk perceived age less than 30 years; weekends versus weekdays; one county, and the ID carrying condition). The fitted model accounted for one sixth of variation in outcome (pseudo $r^2 = 0.176$; likelihood ratio $\chi^2_{(6)} = 85.1$, $p < 0.0001$). Minors who were

Table 4 Cigarette sales rates by purchase attempt circumstances (cases where clerk asked for proof of age)

	Attempts (n)	Sales rate (%)
Total	939	7.1
Sex of minor		
Male	809	8.2**
Female	130	0.8**
Age of minor (years)		
14	164	1.2***
15	464	6.9
16	144	8.3
17	167	12.6**
Time of day		
am	449	5.1*
pm	489	9.0*
Day of week		
Sunday	57	7.0
Monday	50	12.0
Tuesday	93	11.8
Thursday	45	17.8**
Friday	53	1.9
Saturday	641	5.8*
County (coded)		
A	148	13.3
B	85	3.5**
C	224	7.6**
D	392	8.7**
E	108	28.7***
F	131	26.0***
Sex of clerk		
Female	513	8.2
Male	426	4.9
Age of clerk (years)		
<30	293	9.9
30–50	457	5.5
>50	189	6.9
ID assignment		
No ID	462	2.0***
ID	477	12.2***

*p<0.05; **p<0.01; ***p<0.001.

Table 5 Purchase rates (%) for individual minors when ID was requested, by ID condition

Minor code	Age (years)	Sex	No ID	ID shown
047	17	Male	0	21.7
055	15	Male	3.4	14.8
076	16–17	Male	20.0	28.6
085	16	Female	0	3.7
092	15	Male	0	8.7
100	16	Male	0	36.8
122	15	Male	0	8.3
129	16	Male	0	13.0
130	17	Male	6.0	0
135	14	Male	2.1	2.7
138	14	Female	0	0
139	15	Male	2.8	18.8

What this paper adds

Cigarette sales to minors are prohibited in at least 80 nations and are often monitored through supervised, underage purchase attempts known as compliance checks. The usual objective is estimation of the tobacco sales rate to genuine underage buyers in a defined geographic area. Many compliance check protocols are known to bias the estimate, but one protocol—presentation of a valid identification document with the minor's true age—was not fully assessed.

This controlled experiment (n=1083) found that presentation of valid, underage identification documents increased illegal cigarette sales to minors more than sixfold.

male or age 17 years had significantly increased odds of purchasing cigarettes. Clerks perceived to be younger than 30 years were significantly more likely to sell, and odds of sales were significantly higher on weekdays than weekends. The OR of sale when ID was presented was higher in the fitted model than in the absence of covariates (8.0 *v* 7.0, NS).

A final model was fitted to assess the importance of clerk requests for proof of age. This model "explained" one third of the outcome (pseudo $r^2 = 0.330$; likelihood ratio $\chi^2_{(11)} = 272.4$, $p < 0.0001$). Odds of sale were significantly higher for males, 17 year olds, clerks perceived younger than 30, weekdays, Saturday versus Sunday, and clerks who did not request proof of age; odds were significantly lower for 14 year olds. Sale was nearly 17 times more likely when clerks did not ask for ID (OR 16.8) and was nearly four times more likely when minors presented ID (OR 3.8). We then used the model to predict sales rates under hypothetical conditions where asking and presenting behaviours were varied. Predicted sales rates were more sensitive to clerks' asking than minors' presenting behaviours (table 6).

DISCUSSION

Minors who show valid, underage photo ID upon clerk request are able to buy cigarettes more often than those who do not. The ID effect appears stable across individual minors, minors' age (14–17 years) and sex, time of day, days of the week, counties, and clerk sex and perceived age. The sixfold increase in the current study is not explainable by confounding from other determinants of cigarette sales; if anything, results suggest that other factors may have slightly masked the ID effect. The estimated ID effect is smaller than the impact reported in Massachusetts,[20] which may reflect study design, true regional variability, or large margins of error in the earlier study. The current study suggests that the ID effect can increase cigarette sales to minors by nearly one third, even in locales where proof of age is usually required by clerks.

Still unclear is how often minors exploit the ID effect when genuinely trying to buy cigarettes. Focus groups in Massachusetts[31] indicate that in parts of that state, minors sometimes do use ID as one of several ways to circumvent compliance with tobacco sales age controls. Again, the

Table 6 Predicted purchase rates under modelled hypothetical conditions (%, 95% confidence intervals)

		If minors carried ID . . .		
		Always	Random half of cases	Never
If clerks asked ID . . .	Always	11.5 (10.8 to 12.1)	7.6 (7.0 to 8.1)	3.7 (3.5 to 4.0)
	87% of cases (rate in experiment)	17.7 (16.3 to 19.0)	13.0 (11.8 to 14.2)	8.1 (7.2 to 9.0)
	Random half of cases	34.0 (32.3 to 35.7)	21.4 (20.2 to 22.5)	17.5 (16.3 to 18.7)

frequency may vary widely in different locales, and further research is needed.

Perhaps the most complex issue of the finding is its implication for estimated rates of tobacco sales to minors. Where investigative protocols require that minors *not* present ID upon clerk request, estimates of cigarette sales law violation rates will be lower than if minors did present ID. The unknown is which protocol more closely estimates true compliance rates in settings where clerks usually ask for proof of age. Where clerks do not ask, the ID effect will be considerably smaller.

The same concern applies to other compliance check protocols known to affect the outcome—age, sex, ethnicity, alterable appearance, individual characteristics, and in-store behaviours. For unbiased estimation, compliance checks should closely simulate the demographic and behavioural diversity of the purchasing minor population. In many cases, agencies that estimate rates of tobacco sales to minors have only a limited pool of investigative minors and cannot proportionally represent the diversity of minors and their behaviours. Nevertheless, estimates will be far more accurate if this diversity is mirrored. Several states now conduct medium to large scale youth tobacco surveys with questions that yield cigarette purchase prevalence rates and behaviours. These results (combined with population data) can support synthetically estimated rates of purchase by age, sex, ethnicity, and behaviour, which in turn can serve as targets when assembling a compliance check workforce and designing protocols.

The current study found most clerks asking for ID, but the request alone is not producing the desired effect of identifying and turning away underage purchasers. Other authors[4] have suggested clerks may not be trained to go beyond asking for ID and glancing at it. Perhaps photo IDs draw attention to the picture of the bearer. Perhaps busy clerks cannot take time to compute age. Perhaps some clerks choose to do nothing more than demonstrate to supervisors or monitoring cameras that they requested ID. A well controlled California study found that clerks sold nearly four times more often if minors flashed ID cards while requesting cigarettes.[32] Further research should clarify how much the problem will respond to training, enforcement, or both.

Whatever the origins of the ID effect, agencies should properly account for its existence in compliance checks, and cigarette merchants and clerks must be required to verify age. That some minors try to buy cigarettes should surprise no one; that they are more likely to succeed by proving they are too young seems both absurd and preventable.

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