

## RESEARCH PAPER

# Role of parents and peers in influencing the smoking status of high school students in Taiwan

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**Objectives:** To assess parental influence on smoking behaviour by high school students in an Asian culture and to compare the relative importance of parental and peer influence.

**Methods:** A 5% nationally representative sample, including 44 976 high school students in 10th to 12th grade (aged 15–18 years) in Taiwan, were surveyed in 1995. Each completed a long self administered questionnaire. Parental influence was measured by examining both parental behaviour (smoking status) and attitudes (perceived “tender loving care” (TLC) by adolescents). Changes in smoking status were used to determine peer influence, defined as the increase in the likelihood of smoking from grade 10 to 12 in a steady state environment. Odds ratios (ORs) were calculated for parental and peer influence, using logistic regression.

**Results:** Adolescents of smoking parents with low TLC had the highest smoking rates and those of non-smoking parents with high TLC had the lowest. The difference was more than twofold in boys and more than fourfold in girls. When either parental smoking status or TLC alone was considered, parental influence was similar to peer influence in boys, but larger than peer influence in girls. However, when smoking status and TLC were considered jointly, it became larger than peer influence for both groups (OR 2.8 v 1.8 for boys and OR 3.9 v 1.3 for girls).

**Conclusion:** When parental influence is taken as parental behaviour and attitude together, it plays a more important role than peer influence in smoking among high school students in Taiwan. This study, characterising such relationships among Asian populations for the first time, implies that future prevention programmes should direct more efforts toward the parental smoking and parent–child relationships, and not aim exclusively at adolescents in schools.

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It has long been recognised that adolescents do not try cigarettes in a vacuum,<sup>1</sup> and “significant others”, such as friends, classmates, siblings or parents, are the most consistent predictors of adolescent smoking.<sup>1–5</sup> Among these “significant others”, having smoking friend(s) has been considered as the most important factor influencing smoking of adolescents in the Western world,<sup>2 6–16</sup> and such observation has been similarly recognised in Taiwan.<sup>17–21</sup> Even though over half of the studies on youth smoking found parental influence playing a significant role,<sup>2</sup> it has received limited attention and mixed reviews.<sup>8 22–26</sup> Associating with peers who smoke is seen by researchers as an integral part of the initiation and progression process toward the development of smoking.<sup>1 27</sup> Indeed, the efforts of most youth tobacco control programmes, including those in Taiwan, have been directed at school settings, partly because schools are easily accessed and partly because of the view that peer influence, not parental influence, is the most important determinant in smoking.<sup>28</sup> Such a view was highlighted by the statement in the US Surgeon General's 1994 report that “parental influence was not as compelling as peer influence”.<sup>29</sup>

Parental influence is culture specific but such influence on adolescent smoking in societies other than Western ones has rarely been examined.<sup>9 10 30–32</sup> Asian parenting style is known to be more authoritarian and expecting of more obedience.<sup>33 34</sup> Even in Western societies, the justification for downplaying parental influence has been questioned.<sup>35 36</sup> In addition, this debate has yet to consider the importance of methodological differences in defining and quantifying “peer influence” and “parental influence” and these differences in definition have prevented a fair comparison.<sup>37 38</sup> Adolescent friendships are often formed or cemented on the basis of a

common behaviour such as smoking, and, in these cases, “peer selection” rather than peer influence produces the association between friends and smoking. Several studies show that smoking adolescents actively seek out groups of friends with similar smoking behaviours and attitudes,<sup>39–41</sup> in essence forming smoking cliques.<sup>1 39 42–44</sup> When friend selection, selected based on established smoking status, is counted as part of the peer influence, such influence will be overestimated.<sup>5 25 37 45</sup> On the other hand, depending on how it is defined, parental influence is easily underestimated. Studies on parental influence are generally limited to the one common variable of parental smoking. Parental attitude, such as the level of caring support, or parental policies on smoking at home, may be as important as parental smoking,<sup>1 46–48</sup> and yet attitude has less often been considered as an independent factor when compared against peer influence.<sup>1</sup> Unless attitude is considered together with behaviour, it appears likely that parental influence will be only partially assessed.<sup>38 49</sup> A recent review of 87 studies on familial influences on adolescent smoking concluded “methods are limited by a lack of standardized instruments, ...and the use of inconsistent definitions...”<sup>22</sup> Because of these pitfalls in overestimating peer influence<sup>37</sup> and underestimating parental influence,<sup>38 49</sup> it is important to re-examine the widely held belief that peer influence is the prime determinant,<sup>3 4</sup> particularly in a population with an Asian culture.

Furthermore, peer influence has traditionally been studied by directly asking adolescents whether their commencement of smoking was influenced by peers. An answer here requires subjective retrospective recall of events and reaching a judgment on the determinants of a past behaviour. For

**Abbreviations:** OR, odds ratio; RR, rate ratio, TLC, tender loving care

example, upon questioning by teachers, some students are likely to offer more “politically correct” or “expected” answers, and blame friends rather than parents. This pattern of responses is of particular concern, as these answers bias the results in only one direction and cannot be objectively validated. The use of direct questioning is also found to be problematic when adolescents are asked “whether their best friends smoke”.<sup>5, 22</sup> An affirmative answer does not necessarily indicate a causal relationship, but more of a “rater effect”, which tends to project their own behaviours and overestimate “friendship homophily”.<sup>5</sup> It may simply demonstrate that, because of common interests, smokers generally befriend other smokers. Given these methodological limitations, in this study we chose to use an alternative approach to assess peer influence. Peer influence was based, not on opinions, but on objective data—that is, the actual smoking status among the classmates or schoolmates. Using national survey data from Taiwan, this paper assesses parental influence on smoking among high school students in an Asian culture and compares the relative influence of peers and parents on smoking.

## METHOD

In 1995, a nationwide survey of senior high school students (grades 10–12) was conducted to assess behavioural risk factors in Taiwan. A total of 44 976 students were surveyed (girls 22 821, boys 22 155). This was nearly 5% of the national high school population of 959 081. Most students in the study were aged 15–18 years. The study represented students from all three high school types. In Taiwan, students enter high school through a testing system. Regular high schools have the highest academic standing and are considered the most prestigious, vocational high schools are the least prestigious, and five year junior colleges are in between. In the case of five year junior colleges, the first three years are equivalent to high school.

Each student completed an anonymous, self administered questionnaire on behavioural risk factors. A public health nurse collected the completed questionnaire and assured its confidentiality bypassing school administration. At the time

of the survey, no parental consent was required and students were not informed that they could decline participation.

Each student completed a list of over 60 multiple choice questions, including two on smoking and eight on parent–adolescent relationships. Smoking status questions were: (1) “Do you currently smoke?”—yes/no; and (2) “Is any member of your family a smoker?”—parents, siblings or others? (only answers of “parents” were used in this analysis). A correlation matrix compared answers from the eight parent–adolescent relationship questions (table 1, footnote). All eight were found to be highly correlated (Cronbach’s coefficient  $\alpha$  0.89). We therefore selected a single question (“On the whole, do you feel that your parents love you and care about you? i.e. How much TLC do you receive from your parents?”—very high/high/medium/low/very low) to represent the adolescents’ perception of parental level of tender loving care (TLC). This TLC answer showed significant correlation with each of the seven other answers ( $r = 0.43–0.59$ ). To facilitate statistical analysis the answers were grouped into two categories: high TLC (very high, high, and medium); and low TLC (low and very low).

Both univariate and multivariate logistic regression analyses were performed to calculate the rate ratios (RR) and odds ratios (OR), respectively, for parental influence and peer influence on adolescent smoking. Multivariate analysis included sex, type of school, peer influence, and parental influence as independent variables. Changes in smoking prevalence from the survey were used to determine peer influence, which was defined as the increase in the likelihood of smoking from grades 10 to 12 in a steady state environment. As discussed below, the assumption of a steady state in the external environment is made to exclude potential confounders affecting smoking. All statistical analyses were performed with SAS version 8.0.

## RESULTS

Nearly a quarter (24.5%) of boys smoked whereas smoking was approximately a fifth as prevalent (5.1%) in girls (tables 1 and 2). Smoking rates generally increased stepwise through grades 10–12, in each type of high school, for both boys and girls. Regular high schools had the lowest smoking rates

**Table 1** Smoking rates (%) by parental behaviour (smoking) and attitude (TLC)†, by grade levels and by type of high school among boys

	Overall	Parental smoking		Parental TLC		Non-smoking parents with high TLC	Smoking parents with low TLC
		No	Yes	High	Low		
Total	24.5 (22155)	16.5 (8093)	25.0* (10810)	20.3 (16617)	29.3* (5538)	14.4 (6305)	31.0* (2860)
10th grade	18.6 (7949)	13.6 (2883)	20.5* (3966)	15.9 (5846)	26.2* (2103)	11.2 (2204)	27.5* (1093)
11th grade	22.3 (7610)	16.4 (2774)	24.8* (3735)	20.3 (5717)	28.3* (1893)	15.0 (2166)	30.9* (1000)
12th grade	27.4 (6596)	20.1 (2436)	31.0* (3109)	25.2 (5054)	34.8* (1542)	17.5 (1935)	36.1* (767)
Regular high school	14.7 (9350)	10.7 (3858)	16.5* (4212)	12.7 (7277)	21.4* (2073)	8.9 (3112)	22.7* (1002)
10th grade	11.4 (3085)	8.4 (1257)	12.9* (1401)	9.7 (2376)	17.2* (709)	6.8 (991)	19.2* (329)
11th grade	14.4 (3268)	10.1 (1341)	16.2* (1495)	9.8 (2546)	20.9* (722)	8.8 (1094)	22.1* (371)
12th grade	18.3 (2997)	13.5 (1260)	20.8* (1316)	16.0 (2355)	26.6* (642)	11.1 (1027)	27.2* (302)
Vocational high school	30.2 (9441)	24.3 (3004)	32.2* (4953)	28.2 (6688)	35.1* (2753)	22.3 (2200)	36.4* (1498)
10th grade	25.8 (3674)	20.7 (1196)	27.0* (1955)	22.7 (2520)	32.6* (1154)	18.0 (867)	32.9* (641)
11th grade	30.1 (3204)	24.3 (980)	32.1* (1712)	28.7 (2286)	33.6* (918)	23.6 (705)	36.1* (502)
12th grade	36.8 (2563)	29.4 (828)	40.4* (1286)	35.0 (1882)	41.6* (681)	26.8 (628)	43.1* (355)
5 year junior college	22.6 (3364)	16.0 (1231)	24.9* (1645)	20.8 (2652)	29.5* (712)	14.3 (993)	31.7* (360)
10th grade	15.0 (1190)	9.1 (430)	17.1* (610)	13.4 (950)	21.7* (240)	6.9 (346)	21.1* (123)
11th grade	22.9 (1138)	17.9 (453)	25.4* (528)	20.9 (885)	30.0* (253)	16.9 (367)	36.2* (127)
12th grade	31.0 (1036)	22.1 (348)	33.7* (507)	29.2 (817)	37.4* (219)	20.0 (280)	38.2* (110)

\* $p < 0.05$ .

Numbers in parentheses indicate the number of students surveyed.

†Tender, loving care (TLC) question on parental attitude perceived by students was selected from the following 8 questions: (1) On the whole, do you feel that your parents love you and care about you? (2) On the whole, do you feel that your parents love you and understand you? (3) On the whole, do you feel that your parents love you and trust you? (4) On the whole, do you feel that your parents love you and treat you fairly? (5) On the whole, do you feel that your parents love you and respect you? (6) On the whole, do you feel happy about your family life? (7) On the whole, is the relationship good between you and your father? (8) On the whole, is the relationship good between you and your mother?

**Table 2** Smoking rates (%) by parental behaviour (smoking) and attitude (TLC), by grade levels and by type of high school among girls

	Overall	Parental smoking		Parental TLC		Non-smoking parents with high TLC	Smoking parents with low TLC
		No	Yes	High	Low		
Total	5.1 (22821)	2.9 (7694)	6.0* (11593)	4.1 (17281)	8.2* (5540)	2.2 (6074)	9.2* (3025)
10th grade	4.9 (7511)	2.7 (2471)	5.5* (3896)	3.8 (5635)	7.9* (1876)	2.0 (1945)	8.3* (1063)
11th grade	4.8 (7839)	2.4 (2651)	5.8* (3999)	3.8 (5860)	7.8* (1979)	1.6 (2074)	8.8* (1076)
12th grade	5.6 (7471)	3.5 (2572)	6.7* (3698)	4.6 (5786)	9.0* (1685)	3.0 (2055)	10.6* (886)
Regular high school	2.8 (9165)	1.5 (3535)	3.5* (4306)	2.3 (7278)	4.8* (1887)	1.0 (2907)	5.0* (990)
10th grade	2.6 (3013)	1.2 (1156)	3.3* (1414)	2.0 (2364)	4.6* (649)	0.7 (955)	4.8* (357)
11th grade	2.8 (3162)	1.4 (1186)	3.4* (1521)	2.1 (2458)	5.1* (704)	0.6 (949)	5.5* (362)
12th grade	3.0 (2990)	1.9 (1193)	3.7* (1371)	2.7 (2456)	4.5* (534)	1.6 (1003)	4.4* (271)
Vocational high school	7.5 (10723)	4.7 (3112)	8.4* (5854)	6.1 (7646)	10.9* (3077)	3.9 (2317)	12.1* (1755)
10th grade	7.6 (3540)	4.9 (993)	7.9* (1999)	6.4 (2487)	10.3* (1053)	4.3 (720)	11.0* (611)
11th grade	6.8 (3571)	3.8 (1039)	7.9* (1959)	5.4 (2525)	10.3* (1046)	2.8 (788)	11.2* (614)
12th grade	8.0 (3612)	5.3 (1080)	9.3* (1896)	6.4 (2634)	12.3* (978)	4.6 (809)	14.5* (530)
5 year junior college	3.6 (2933)	2.3 (1047)	4.1* (1433)	3.2 (2357)	4.9 (576)	1.9 (850)	5.4* (280)
10th grade	2.0 (958)	1.2 (322)	2.1 (483)	1.2 (784)	5.8* (174)	0.4 (270)	4.2* (95)
11th grade	4.1 (1106)	2.1 (426)	5.0* (519)	4.0 (877)	4.4 (229)	1.8 (337)	6.0* (100)
12th grade	4.6 (869)	3.7 (299)	5.1 (431)	4.6 (696)	4.6 (173)	3.7 (243)	5.9 (85)

\*p<0.05.  
Numbers in parentheses indicate the number of students surveyed.

(overall boys 14.7%, girls 2.8%), and vocational schools the highest (overall boys 30.2%, girls 7.5%) with five year junior colleges intermediate (boys 22.6%, girls 3.6%). These smoking rates from the three types of high schools differed significantly (p < 0.01), for both boys and girls.

Among boys, one quarter (25%) with smoking parents smoked, in contrast to 16.5% with non-smoking parents (table 1). The smoking rate among those reporting low TLC was 29.3%, compared to 20.3% for those with high TLC. In the presence of both low TLC and smoking parents, 31.0% of boys smoked as opposed to 14.4% with non-smoking and high TLC parents, or a difference of over 2:1. Parental smoking rate was 57.2% among male students (not shown).

Among girls, 6% with smoking parents smoked, in contrast to 2.9% with non-smoking parents (table 2). The smoking rate among those reporting low TLC was 8.2%, compared to 4.1% of those with high TLC. In the presence of both low TLC and smoking parents, 9.2% smoked, as opposed to 2.2% with high TLC and non-smoking parents, or a difference of over

4:1. Parental smoking rate was 60.1% among female students (not shown).

If parents smoked, their children had a higher chance of smoking (1.7 times for boys and 2.2 times for girls) than if parents did not smoke (table 3). Similar results were seen if students received low TLC (RR 1.6 for boys and 2.1 for girls). Students with smoking and low TLC parents were 2.7 times more likely to smoke than students with non-smoking and high TLC parents in boys and 4.4 times in girls. The above analysis was repeated for students in each of the three different types of schools. Results were virtually the same as those shown in table 3.

The increase in the likelihood of smoking from 10th to 12th grade was assessed among students with parents of different smoking status and different TLC (table 3). The RRs ranged between 1.5 and 1.9 for boys and 1.1 and 1.5 for girls. Nearly all RRs were significant.

Additional analysis using a multivariate model, adjusting for sex and type of school, was also conducted to compare

**Table 3** Rate ratios for comparing the presence or absence of parental and peer factors influencing smoking status

Influencing factors	Boys	Girls
<b>Parental factors</b>		
A. Smoking		
Non-smoking parent	1.0	1.0
Smoking parent	1.7 (1.6 to 1.8)	2.2 (1.8 to 2.5)
B. Tender loving care (TLC)		
High TLC parent	1.0	1.0
Low TLC parent	1.6 (1.5 to 1.7)	2.1 (1.9 to 2.4)
C. Smoking and low TLC co-existed		
Non-smoking with high TLC parent	1.0	1.0
Smoking with low TLC parent	2.7 (2.4 to 3.0)	4.4 (3.6 to 5.5)
<b>Peer factor</b>		
A. Student with non-smoking and high TLC parent		
10th grade	1.0	1.0
12th grade	1.7 (1.4 to 2.0)	1.5 (1.0 to 2.3)
B. Student with non-smoking and low TLC parent		
10th grade	1.0	1.0
12th grade	1.6 (1.2 to 2.1)	1.1 (0.6 to 1.8)
C. Student with smoking and high TLC parent		
10th grade	1.0	1.0
12th grade	1.9 (1.7 to 2.2)	1.2 (1.0 to 1.6)
D. Student with smoking and low TLC parent		
10th grade	1.0	1.0
12th grade	1.5 (1.2 to 1.8)	1.3 (1.0 to 1.8)

Numbers in parentheses are 95% confidence intervals.

**Table 4** Odds ratios (OR) for factors affecting smoking behaviours of high school students using multivariate logistic regression

Influencing factors	Boys	Girls	Total
Peer influence*	1.8 (1.6 to 2.0)	1.3 (1.1 to 1.5)	1.7 (1.5 to 1.8)
Parental influence†			
Smoking	1.8 (1.6 to 2.0)	2.0 (1.6 to 2.5)	1.8 (1.6 to 2.0)
Low TLC	2.1 (1.8 to 2.5)	2.2 (1.6 to 3.1)	2.1 (1.8 to 2.4)
Combined effect (smoking and low TLC)	2.8 (2.4 to 3.2)	3.9 (3.0 to 5.0)	3.0 (2.7 to 3.4)

\*Adjusted for type of school and parental influence.

†Adjusted for type of school and peer influence.

p&lt;0.01, interaction between smoking and TLC; p=0.29, interaction between peer and parental influence.

parental influence and peer influence on student smoking (table 4). Overall, the peer influence was similar to parental smoking factor (OR 1.7 v 1.8), but was weaker than parental TLC factor (OR 1.7 v 2.1). For girls, either one of the parental factors showed greater influence over the peer factor (OR 2.0 and 2.2 v 1.3). When parental influence was jointly assessed from both factors, smoking and low TLC, parental influence became substantially larger than peer influence (OR 2.8 v 1.8 for boys and OR 3.9 v 1.3 for girls). Additional findings showed that parental TLC was not remarkably different from parental smoking status, although OR for TLC (2.1) was slightly larger (1.8).

## DISCUSSION

Although both peer influence and parental influence played an important role in determining the adolescents' smoking, this study shows that parental influence, as a whole, was more important than peer influence in this Asian population. Either parental factor taken alone, smoking or low TLC, exerted more influence on girls' smoking than did their peers. With boys, the combination of the two parental factors had more influence than peers. These observations, based on a nationally representative sample, are at variance with the prevailing opinion in the Western literature, which holds that peer influence is more important than parental influence.<sup>2 5 22 26 27 29</sup> In Asian culture, the relatively authoritarian parenting style and prevailing submissive adolescent mindset are important factors in influencing adolescents, compared to their counterparts in Western culture. The high rate of smoking (46%) and low rate of cessation (7%)<sup>50</sup> among male adults in Taiwan, reflective of parental behaviour and attitudes toward smoking, would also exert more of the negative parental influence than in a society where smoking rate is low and cessation rate is high.

This study shows the importance of how peer or parental influence is defined in leading to the conclusion on their relative strength. Determining whether peer influences actually cause others to use tobacco is notoriously difficult.<sup>1</sup> In addition, it is likely to confuse peer influence with peer selection. Friends are selected at the beginning of the relationship, while influence is developed over the course of the friendship.<sup>5</sup> Peer influence is traditionally studied by directly asking students whether their smoking was influenced by peers. Such direct questioning on the source of his or her smoking not only leads to results that are subjective and difficult to verify but, more seriously, tends to overestimate peer influence.<sup>5 51</sup> Overestimation arises in two scenarios. First, researchers interpret peer relationship as being responsible for initiating or perpetuating smoking while, in fact, friends have often selected each other on the basis of already established common interests (for example, smoking).<sup>5 52</sup> Some smokers seek out other smokers for places to smoke or for conversation during smoking, while others befriend those smokers sharing common characteristics such as adventurousness, rebellious attraction, or

supportive of smoking behaviour.<sup>1</sup> Consistent with the adage that "birds of a feather flock together", research suggests that teenagers belong to friendship groups with those who are similar to themselves.<sup>5</sup> In reviewing five studies attempting to separate selection from influence effects, selection has been concluded to be as important if not more important than influence.<sup>42 51 53-55</sup> Second, there is a tendency among study adolescents to give "expected" or "politically correct" answers. It has been reported as a form of "projection" as adolescents tend to attribute their own behaviours to friends.<sup>37</sup>

In this study, an alternative approach has been taken. Instead of asking for individual judgment on why they smoke, we used changes in the level of smoking prevalence among classmates or schoolmates as an assumed average influence that a student is exposed to. The more your classmates smoke the more affected you will be. While our study is concerned more with average group smoking behaviour, it could be argued that the intensity of peer influence differs with each individual and the use of group data may have masked such variability.

Most studies assume that the critical determinant of parental influence is whether they smoke or not.<sup>22</sup> This influence is obvious when youngsters hold smoking parents as a role model to imitate.<sup>2 56</sup> In addition, having cigarettes easily available in the home certainly facilitates adolescent experimentation.<sup>2 57</sup> However, we have found that parental influence is much more than simply their smoking behaviour. Parental attitude, which may be expressed in terms of tolerance toward smoking or the extent of TLC exhibited toward children, is another important dimension of parental influence. Ours is one of very few studies comparing the dual parental factors of smoking behaviour and perceived parental attitude.<sup>8 27 58 59</sup> Two studies that did take this approach found that the joint effect was much more powerful than individual effect. Nolte *et al* reported a 10-fold synergistic relationship in youth smoking between smoking parents who were permissive and non-smoking parents who disapproved of smoking.<sup>49</sup> Newman replicated this study and found a smaller, though still significant, threefold difference.<sup>38</sup> In contrast, a smaller relationship was found in both studies (twofold or less), when only one variable (behaviour) was considered. In our study, parental smoking yielded odds ratios of 1.8 for boys and 2.0 for girls. However, when attitude (TLC) was added, the relationship became much larger, 2.8 for boys and 3.9 for girls. These results confirm the notion that parental influence has been underestimated in studies when only one aspect of parenting was considered.

The need for a steady state assumption is important and is a prerequisite for comparing peer influence exerted over a period of time. In reviewing 87 studies on peer and familial influences, "failure to measure important confounding and mediating factors" has been noted.<sup>22</sup> Other than peers and parents, external events could affect the smoking status of the adolescents during this period of time. They include

activities having either positive or negative impact on smoking status.<sup>2</sup> In both cross sectional and longitudinal study designs, such a steady state assumption is needed to hold external confounders constant in order to make a valid comparison of peer influence over time. When the study period is relatively short and few external events had affected smoking, as in this study, this steady state assumption is not unreasonable.

We applied several epidemiological principles of causality to assess the validity of the findings—that is, strength, consistency, and temporal relationship. The strength of the relationship is strong and significant. Results are consistent, not only for boys and for girls, but also consistently observed for each type of school in each sex. That girls were more influenced by parents than boys in this study, is consistent with Asian cultural norm where girls are more obedient than boys in accepting parental advice.<sup>60</sup> Several other studies have also reported, as in this study, that parental influence was equal<sup>24 58 61–64</sup> or more important than peer influence.<sup>65–67</sup> When smoking rates of adolescents and adults were compared in 24 states in the USA, they were found to be highly correlated—that is, states with higher adult smoking rates showed higher adolescent smoking rates, supporting the aetiological importance of the parental role.<sup>68</sup> As to temporal relationship, parents usually have intimate relationships, much earlier than peers, by starting from early infancy. All children want to imitate parents from early childhood.<sup>11 69–72</sup> Parents generally have much longer and more frequent contact with their children than any peer claiming to have influence over them. Most parents usually remain throughout one's adolescence, while peers or best friends change frequently.<sup>1 73</sup> For example, over a two year period in a longitudinal study, more than half of the high school smokers and non-smokers changed peer groups.<sup>39</sup>

Several tobacco control advocates (Glantz,<sup>36</sup> Hill,<sup>74</sup> Males<sup>35 68</sup>) have raised strong arguments for emphasising the reduction of adult smoking as the mainstay to reduce youth smoking. This is because "School based programs attacking peer influence could be counterproductive by making smoking alluring as a forbidden, adults-only habit".<sup>1 75</sup> Such a view is fully consistent with the implications arising from this study that parental influence plays a critical role in their youth smoking.

These findings have important implications for Asian countries. School programmes should include more efforts on the parental factors, and not exclusively directed at adolescents on campus.<sup>67 75</sup> Parents could become motivated by the awareness of the negative role they play in their children's lives and the potential of dual benefits if they quit smoking.<sup>76 77</sup> As noted by Jacobson *et al* in the book *Combating teen smoking*, interventions that inform parents about the message that their smoking behaviour or tolerance toward smoking sent to children should be emphasised.<sup>1</sup>

There are a number of limitations to this study. First, the measure of smoking is based on a single question about whether the respondent currently smokes, but "current smokers" in this survey did not follow the conventional definition. To assess the potential impact from differences in definition, we compared the prevalence of smokers in this study with that of a more recent national survey which used the World Health Organization definition of "current smokers".<sup>30</sup> The results were virtually the same. For example, the smoking prevalence of current smokers among boys in the recent survey were 19.3%, 22.6%, and 27.5% for grade 10, 11, and 12, respectively,<sup>78</sup> as compared to 18.6%, 22.3%, and 27.4% from this study. Second, this study used "perceived level of tender loving care" from parents as an indicator of the parental relationship, and did not use the commonly used parenting style (such as authoritative). However, as this

## What this paper adds

In Taiwan, peer influence, traditionally viewed as the critical factor in affecting adolescent smoking, is not as important as parental influence, when both parental smoking and parental attitudes are considered together. Previous studies have overestimated peer influence and underestimated parental influence because they were defined differently. Youth smoking intervention programmes should focus more on parental smoking and parent-child relationships, and not aim exclusively at adolescents in schools. The role of adults, both their behaviours and attitudes, is too important to be ignored in any youth prevention programme.

question was found to be highly correlated with seven other questions in the same domain, it does reflect the parenting style of the adolescents. Third, data were presented on parental smoking without separating fathers from mothers. This is because our study was focused more on parental smoking as whole, and the number of smoking mothers was too small to provide a reliable estimate. (The smoking rate for fathers was 56%, while the rate for mothers 5%.<sup>78</sup>) Fourth, peer influence was defined as any factor other than parental influence, and this may have led to an overestimation of the peer influence. Given that the study is to assess the relative strength between the two, our study result on parental influence would, therefore, be on the conservative side. Fifth, the measures used to assess the parental influence were not comprehensive. For example, parental smoking intensity was not available and could not be analysed. Finally, the difference in smoking rates was based on a cross sectional survey rather than a longitudinal follow up. Given the large sample size, short time lapse and the steady state assumption, the impact of the difference in study design would be negligible.

Despite these limitations, we believe this study, based on nationally representative data, demonstrates that parental influence plays as important or more important role than peer influence in affecting adolescent smoking.

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