Mass media campaign improves cervical screening across all socio-economic groups

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Abstract

Low socio-economic status (SES) has been associated with lower cervical screening rates. Mass media is one known strategy that can increase cervical screening participation. This study sought to determine whether a mass media campaign conducted in Victoria, Australia, in 2005 was effective in encouraging women across all SES groups to screen. Data were obtained from the Victorian Cervical Cytology Registry for each Pap test registered during 2005 and categorized into SES quintiles using the Index of Socio-Economic Advantage/Disadvantage. Negative binomial regression was used to determine the impact of the campaign on the weekly number of Pap tests and whether the media campaign had a differential effect by SES, after adjusting for the number of workdays per week, age group and time since previous test. Cervical screening increased 27% during the campaign period and was equally effective in encouraging screening across all SES groups, including low-SES women. Mass media campaigns can prompt increased rates of cervical screening among all women, not just those from more advantaged areas. Combining media with additional strategies targeted at low-SES women may help lessen the underlying differences in screening rates across SES.

Introduction

Cervical screening is an effective way of reducing cervical cancer incidence and mortality [1, 2]. Since the introduction of an organized national screening programme in Australia in 1991, the incidence of cervical cancer and subsequent mortality has declined substantially [3]. In the Australian state of Victoria, 88.0% of women had a Pap test in the 5-year period 2002–06 [4]. However, only 63.4% had undergone a test in 2005–06, thus meeting the Australian recommendations which are to have a Pap test every 2 years [4]. Therefore, there is still an opportunity to decrease cervical cancer incidence and mortality further by increasing the number of women having regular, two yearly cervical screening.

There is evidence from both Australia [5–7] and other countries [8–11] to suggest that women of lower socio-economic status (SES) are less likely to participate in cancer screening than those who are more advantaged (high SES). There is also evidence to suggest that women from lower SES groups have an increased risk of cervical abnormalities and cervical cancer and of being diagnosed with cancer at a more advanced stage [12–14]. Even when risk factors for infection with oncogenic human papilloma virus (the virus that is associated with 99.7% of cervical cancers) [15] are controlled for, fewer years of education is still associated with a diagnosis of a high-grade abnormality (cervical...
intraepithelial neoplasia Grade 3) or cancer [16]. Thus, it is crucial that strategies aimed at increasing cervical screening are effective with women in lower SES groups.

Mass media has been extensively used to promote health messages. Several literature reviews have concluded that mass media campaigns can be an effective strategy to improve health-related behaviours [17–19], including screening behaviours [17, 19]. However, the conclusions reached in these reviews differ in relation to whether mass media alone can be effective in influencing this behaviour change. One view is that mass media works best when combined with other strategies [17, 19], although evidence is lacking as to the exact combination of strategies that works best [19]. A recent review concluded that ‘Many population studies document reductions in smoking prevalence when mass media campaigns are combined with other strategies in multicomponent tobacco control programs’ [20]. An alternate viewpoint is that mass media can produce small-to-moderate effects without additional strategies, but only when proven media design principles are followed [18].

A commonly held belief is that mass media campaigns only influence the behaviour of those who are most advantaged and that those most at risk receive no benefit. Diffusion of innovation theory holds that some individuals in society tend to adopt new ideas more quickly than others, with factors such as education level and financial resources influencing the speed of uptake [21, 22]. Thus, low-SES women, with less education and reduced financial means, may be slower than more advantaged women to act on screening messages presented via mass media [23]. There is no study known to the authors that has measured the impact of a mass media campaign on the cervical screening rates of women across different SES groups. However, several studies have measured the impact of media on other health-related behaviours (predominantly tobacco related) across SES.

One study from The Netherlands tested the effectiveness of two media campaigns that promoted folic acid use prior to pregnancy across different SES groups, defined by educational level [24]. This study found that although women with lower education used folic acid less than women with higher education, the media campaigns led to increased folic acid use across both lower education and higher education groups. An Australian population study that evaluated the effectiveness of early anti-tobacco smoking advertising during the 1980s found that the decline in smoking levels attributed to the campaign also did not differ across education level [25]. Another more recent Australian study tested the difference in call rates to a smokers’ help-line by SES group, over a 3-year period in which multiple anti-smoking mass media campaigns were conducted [26]. SES was positively associated with call rates, however, when media activity occurred, and calls to the line increased, the increase was the same across SES groups. A cross-sectional population-based study found that American women with low education not only responded to mass media anti-smoking advertising but that they also tended to have greater relative declines in smoking compared with more highly educated women in response to it [27]. Although these results imply media campaign effects might extend to women of lower SES, the effect of mass media on the cervical screening behaviour of women of different SES has not previously been examined.

This paper reports on data from a mass media campaign that was designed to promote regular cervical screening among Victorian women whose Pap test was overdue. Initial interviews with women indicated that although most knew that they should have a Pap test every 2 years, many found the test uncomfortable and needed additional prompts to motivate them to actually have one. The advertisement was designed to provide that additional prompt. The advertisement acknowledged that many women found Pap tests uncomfortable, but emphasized how much worse the consequences of not having a test could be. The final scene shows a woman walking into a doctor’s office to have her test, modelling the desirable behaviour. An initial evaluation conducted after the campaign was first broadcast in 2004 indicated that the television advertisement had been successful at increasing
cervical screening rates among women who needed a Pap test [28].

The study aimed to determine (i) whether the media campaign led to an increase in the overall number of Pap tests conducted during the campaign period compared with the non-campaign period and (ii) whether the effect of the media campaign was the same across all socio-economic groups. Many evaluations of health promotion campaigns must rely on self-report data of behaviour change to monitor impact, and previous research has indicated that using self-report measures of cervical screening utilization may overestimate the actual screening levels achieved [29, 30]. This study used the number of Pap tests registered across the state during 2005 to measure the impact of the campaign.

### Methods

**Mass media campaign and exposure measure**

In Victoria, a mass media campaign was developed in 2004 and broadcast in 2004 and 2005. The key target group for the campaign was women aged 40–69 years whose Pap test was overdue. The proposed creative concepts went through an extensive qualitative developmental process to ensure that they resonated with that audience, and the focus groups included women from lower SES groups. The ‘Don’t just sit there’ campaign featured a series of women’s legs in a variety of situations and a voice-over acknowledging that although having a Pap test can be uncomfortable being treated for cervical cancer can be far more uncomfortable. The images were chosen to portray women of a range of ages, and the clothing worn would convey to an Australian audience that the women came from a range of SES groups. The voice-over concluded by saying ‘If you haven’t had a Pap test in the last two years, stop putting it off. Make an appointment today with your doctor or community health centre’. The tagline of the advertisement on the screen was ‘Pap tests. Every two years. It could save your life’ (see http://www.papscreen.org.au). The campaign consisted of a 30-s television advertisement, with a 15-s cut-down version, a 30-s radio advertisement and print versions suitable for newspapers and posters (see Fig. 1).

The television component of the 2005 campaign ran for 6 weeks (3 weeks on, 1 week off and 3 weeks on) from weeks commencing 8, 15, 29 May and 5, 12, 19 June in programmes rated as appealing to women in the target age group. The weekly target audience rating points (TARPs) achieved for women aged 40–64 years during the campaign period from Week 1 to Week 6 were 220.8, 231.5, 165.9, 134.8, 115.4 and 131.4, respectively. The TARPs were highest in the first 2 weeks due to more being spent on the media in those weeks and also to a greater number of free, bonus advertising spots being provided by the television stations in those weeks. TARPs are a standard measure of television advertising weight and are used to indicate the number of people in a predefined demographic group who were exposed to an advertisement within a given period of time. A value of 100 TARPs for 1 week is estimated to be an average of one exposure per person in the target population for that week of the campaign. Therefore, on average, women were exposed to the ‘Don’t just sit there’ advertisement one to two times each week during the campaign period. The exposure measure used in the study was the presence or absence of the mass media campaign (coded 1 or 0, respectively). All analyses were conducted on 2005 data.

**Outcome data**

The outcome data used in this study came from the records of the Victoria Cervical Cytology Registry (VCCR), which maintains a confidential, computerized database of Victorian women’s Pap test results. The VCCR assists with the follow-up of abnormal smears and ensures that a reminder letter is sent to women if their Pap test is overdue. Although participation in the VCCR is voluntary, the non-participation rate is estimated to be <1% [4]. The Registry permits identification of a woman’s postcode, age and the length of time since her last Pap test. Data were only released from the VCCR if there were more than five Pap tests registered for any
one postcode in order to safeguard the privacy of the women in those areas. Only the first test registered for each woman during 2005 was used (women may have had multiple tests registered due to follow-up tests conducted for abnormalities). The outcome measure was the volume of Pap tests each week of 2005 for women aged 18–69. Approval for the extraction and analysis of this data was obtained from the Human Research Ethics Committee at The Cancer Council Victoria prior to study commencement.

SES was determined using postcode data. Postcodes were classified using the Index of Socio-Economic Advantage/Disadvantage, an area-based socio-economic index developed by the Australian Bureau of Statistics (http://www.abs.gov.au). The Index is derived from information about the income, education, occupation, housing and household composition of the district’s residents. SES is classified into quintiles, with low quintiles indicating high disadvantage (low SES). Women with unidentifiable postcodes, or postcodes with no SES score, were excluded from the analysis (representing 0.4% of the total tests).

Analysis
Poisson regression is normally suited to modelling the effect of covariates on a count variable such as the number of Pap tests. However, we employed negative binomial regression because the data were overdispersed (i.e. the Poisson model underestimated

Fig. 1. Print advertisement featuring images from the television advertisement.
the variance of the outcome). In a generalized linear model such as the negative binomial regression that uses the logarithm as the link function, the offset term represents the denominator of a rate (screening rate, in the present research) and is treated as a covariate whose coefficient is constrained to unity [31].

We used the log of the population count of women aged 18–69 who had not had a hysterectomy as the offset term. General population estimates for each age category (18–39 and 40–69) and quintile were obtained from the 2001 Australian Census (http://www.abs.gov.au). The proportion of women who had not had a hysterectomy in each age category and quintile was derived from the 2001 Australian National Health Survey; for women aged 18–39, they were 1.00, 1.00, 0.98, 0.98 and 1.00 in the most disadvantaged to the least disadvantaged, respectively; for women aged 40–69, they were 0.81, 0.80, 0.77, 0.81 and 0.80, respectively. Our regression models adjusted for age (coded as above), time since previous Pap test (coded <21, 22–27, 28–60, >61 months and never previously screened) and number of working days per week. We used 22–27 months as our reference category of appropriate two yearly Pap testing in the regression model. Pap tests conducted in the 2 months prior to the two yearly interval are still considered to be within the guidelines and cost-effective [4]. A reminder letter is sent to women 27 months after their test, so including Pap tests conducted up to this point means women who are only slightly overdue for their test are included, but we know that they have not been prompted by the letter. We used week as a covariate to de-trend the data, as the number of Pap tests conducted during the year tends to fluctuate as a function of the time of year. All statistical analyses were performed with Stata 10.0.

Results

Within the 52 weeks of the study, there were 528,473 Pap tests from identifiable postcodes. The percentage of eligible woman from each quintile who had a test was estimated to be 31.1 (lowest SES), 37.2, 38.2, 38.0 and 41.4% (highest SES).

Figure 2 presents the average weekly number of Pap tests for 2005, in addition to data from 2003 and 2006, when no media campaign occurred (data from 2004 are not included as a mass media campaign took place in that year). The figure demonstrates that there was an increase in the volume of Pap tests in 2005 at the time of the campaign, which was greater than that observed at the same time of

Fig. 2. Pap tests per week for 2003, 2005 and 2006.
year in years when a campaign did not run. The graph shows that a higher volume of Pap tests in 2005 appears to correspond with the first half of the campaign period and to a lesser extent with the second half. The dip in one week in the second half of the campaign period coincided with a week that contained a public holiday.

Table I shows both crude and adjusted rate ratios (i.e. exponentiated regression coefficients) from the negative binomial regression for the effect of covariates on Pap test rate. Adjusted rate ratios are reported below to address the aims of the study. Model 1 relates to the first aim: whether there was an increase in Pap tests during the campaign period; Model 2 relates to the second aim: whether the impact of the campaign was different across SES groups. As shown in Model 1, the Pap test rate increased 27% [95% confidence interval (CI) 1.20–1.33] during the campaign period. SES and Pap screening were positively associated. Screening rate was highest in the highest SES quintile, 26% (95% CI 1.20–1.33) higher than the lowest SES quintile. The screening rate for women aged 40–69 was 5% higher (95% CI 1.01–1.09) than women aged 18–39. The screening rate for women who screened early (<21 months) was 16% (95% CI 0.79–0.88) lower than the reference category, 22–27 months. Beyond 27 months, screening rates declined as the number of months since the previous test increased. The screening rate for women who

### Table I. Rate ratios (RRs) and CI from negative binomial regression of log of number of Pap tests on covariates

<table>
<thead>
<tr>
<th>Covariate</th>
<th>Crude RR (95% CI)</th>
<th>P value</th>
<th>Model 1</th>
<th>Adjusted RR (95% CI)</th>
<th>P value</th>
<th>Model 2</th>
<th>Adjusted RR (95% CI)</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mass media campaign</td>
<td></td>
<td>&lt;0.001</td>
<td>1.00</td>
<td>1.28 (1.16–1.40)</td>
<td>&lt;0.001</td>
<td>1.00</td>
<td>1.24 (1.10–1.39)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>No campaign</td>
<td>1.00</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campaign</td>
<td>1.28 (1.16–1.40)</td>
<td></td>
<td></td>
<td>1.27 (1.20–1.33)</td>
<td>&lt;0.001</td>
<td>1.24 (1.10–1.39)</td>
<td>&lt;0.001</td>
<td></td>
</tr>
<tr>
<td>SES</td>
<td></td>
<td></td>
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<td></td>
<td></td>
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<tr>
<td>First quintile (low SES)</td>
<td>1.00</td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Second quintile</td>
<td>1.19 (1.08–1.31)</td>
<td>&lt;0.001</td>
<td>1.00</td>
<td>1.15 (1.09–1.21)</td>
<td>&lt;0.001</td>
<td>1.15</td>
<td>1.15 (1.09–1.22)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Third quintile</td>
<td>1.23 (1.12–1.36)</td>
<td>&lt;0.001</td>
<td>1.05</td>
<td>1.20 (1.13–1.26)</td>
<td>&lt;0.001</td>
<td>1.19</td>
<td>1.19 (1.12–1.26)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fourth quintile</td>
<td>1.20 (1.10–1.33)</td>
<td>&lt;0.001</td>
<td>1.03</td>
<td>1.15 (1.09–1.22)</td>
<td>&lt;0.001</td>
<td>1.15</td>
<td>1.15 (1.09–1.22)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Fifth quintile (high SES)</td>
<td>1.32 (1.21–1.46)</td>
<td>&lt;0.001</td>
<td>1.02</td>
<td>1.26 (1.20–1.33)</td>
<td>&lt;0.001</td>
<td>1.19</td>
<td>1.19 (1.13–1.33)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Mass media × SES</td>
<td></td>
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<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Campaign × first quintile (low SES)</td>
<td>—</td>
<td></td>
<td></td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
<td>0.981</td>
</tr>
<tr>
<td>Campaign × second quintile</td>
<td>—</td>
<td></td>
<td></td>
<td>1.01 (0.86–1.19)</td>
<td></td>
<td>1.05</td>
<td>1.05 (0.89–1.24)</td>
<td></td>
</tr>
<tr>
<td>Campaign × third quintile</td>
<td>—</td>
<td></td>
<td></td>
<td>1.05 (0.88–1.22)</td>
<td></td>
<td>1.03</td>
<td>1.03 (0.88–1.22)</td>
<td></td>
</tr>
<tr>
<td>Campaign × fourth quintile</td>
<td>—</td>
<td></td>
<td></td>
<td>1.05 (0.87–1.21)</td>
<td></td>
<td>1.02</td>
<td>1.02 (0.87–1.21)</td>
<td></td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td>&lt;0.001</td>
<td>0.009</td>
<td>0.009</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>18–39</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>40–69</td>
<td>1.23 (1.16–1.31)</td>
<td>&lt;0.001</td>
<td>1.05</td>
<td>1.05 (1.01–1.09)</td>
<td>&lt;0.001</td>
<td>1.05</td>
<td>1.05 (1.01–1.09)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Time since previous test</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
<td>&lt;0.001</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>≈21 months</td>
<td>0.84 (0.79–0.89)</td>
<td>&lt;0.001</td>
<td>0.84</td>
<td>0.84 (0.79–0.88)</td>
<td>&lt;0.001</td>
<td>0.84</td>
<td>0.84 (0.79–0.88)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>22–27 months</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td>1.00</td>
<td></td>
<td>1.00</td>
<td></td>
<td></td>
</tr>
<tr>
<td>28–60 months</td>
<td>0.76 (0.72–0.81)</td>
<td>&lt;0.001</td>
<td>0.77</td>
<td>0.77 (0.73–0.81)</td>
<td>&lt;0.001</td>
<td>0.77</td>
<td>0.77 (0.73–0.81)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>≥61 months</td>
<td>0.14 (0.13–0.15)</td>
<td>&lt;0.001</td>
<td>0.14</td>
<td>0.14 (0.14–0.15)</td>
<td>&lt;0.001</td>
<td>0.14</td>
<td>0.14 (0.14–0.15)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Never tested</td>
<td>0.31 (0.29–0.33)</td>
<td>&lt;0.001</td>
<td>0.32</td>
<td>0.32 (0.30–0.33)</td>
<td>&lt;0.001</td>
<td>0.32</td>
<td>0.32 (0.30–0.33)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Workdays per week</td>
<td>1.57 (1.46–1.69)</td>
<td>&lt;0.001</td>
<td>1.65</td>
<td>1.65 (1.59–1.73)</td>
<td>&lt;0.001</td>
<td>1.65</td>
<td>1.65 (1.59–1.73)</td>
<td>&lt;0.001</td>
</tr>
<tr>
<td>Week</td>
<td>1.00 (0.99–1.00)</td>
<td>&lt;0.001</td>
<td>1.00</td>
<td>1.00 (0.99–1.00)</td>
<td>&lt;0.001</td>
<td>0.99</td>
<td>0.99 (0.99–1.00)</td>
<td>&lt;0.001</td>
</tr>
</tbody>
</table>

*The rate ratio and CIs for week are slightly smaller than unity.*
had never previously been tested was 68% (95% CI 0.30–0.33) lower than the reference category. Screening increased 65% (95% CI 1.59–1.73) per working day in the week. Week had a rate ratio smaller than unity, indicating a decreasing trend over the year in the rates of screening.

Figure 3 shows the unadjusted average weekly volume of Pap tests when the media campaign was being broadcast, compared with weeks without the campaign, across the SES groups. There was a greater volume of screening during the campaign period for all SES groups, and the extent of increase appears to be very similar across groups. As shown in Model 2 of Table I, likelihood ratio tests for the interaction of SES and mass media campaign in their effect on screening rate revealed no evidence of an interaction ($P = 0.981$), indicating that the campaign promoted screening equally across all SES groups.

**Discussion**

The media campaign was found to increase the number of women screening by 27% during the campaign period compared with the times in 2005 when there was no media campaign. In addition, there was no differential effect found across SES groups in terms of the effectiveness of the mass media campaign in encouraging women to screen. Thus, women from all SES groups responded positively to the campaign, with a similar increase in screening across all SES groups during the campaign period.

This is an important finding for cervical screening programmes; however, the context of this finding should be noted. The 2005 campaign was run in a developed country in which an organized cervical screening programme has been running for >15 years, and participation in cervical screening was already high. In Australia, the pathology component of a Pap test is free, funded by the Federal Government, and there are options for disadvantaged groups to have fee-free consultations. In addition, other activities such as the provision of information brochures for women, media releases and communication with the health professionals who take Pap tests are all ongoing and have been for years, so the media campaign occurred in the context of an already-supportive environment. This should be considered when determining the generalizability of the results.

Lower SES women have been slower to take up cervical screening so far, yet responded well to this campaign. Diffusion of innovation would suggest that as Pap testing has now been available for a considerable amount of time and has been widely adopted, even late adopters are now ready to become regular screeners [22]. The reminder provided by the media campaign may have provided the necessary prompt to action.

The findings from the current study build on those of other studies that examined the influence of media across SES on other health behaviours [24–27]. Cervical screening behaviour differs from the health behaviours described in those studies in that adhering to cervical screening recommendations requires eligible women to carry out screening at regular intervals but not necessarily at the time when a mass media campaign is being run. In comparison, quitting smoking and taking folic acid prior to pregnancy are behaviours for which a call to action can be acted on immediately. Thus, the results of the current study are more relevant to other screening areas, such as bowel or breast cancer, than previous research has been.

One weakness of the study was that the measure of SES was based on area-level and not individual-level
information. We used residential postcodes to categorize women into one of five SES groups according to the Index of Relative Socio-Economic Advantage/Disadvantage. This classification is based on several variables such as occupation, education and income. However, individual women may not reflect the same demographic profile assigned to that postcode by the Index. More precise estimates of the effect of SES may be possible by using an indicator of the individual’s SES (e.g. income, education or occupation), if such data were available. Another possible weakness is data not being included in the study because some Victorian women who had a Pap test in 2005 had it performed in another state or country or chose not to register their Pap test with the VCCR. However, it is unlikely that the number of women this applies to would be large enough to make a difference to the results of the analyses.

Although the study demonstrated that a mass media campaign can increase screening rates across SES groups, it also suggests that mass media may not be enough to address underlying health inequalities. The study confirmed previous findings that low-SES women are less likely to have Pap tests than high-SES women [5–11] and the mass media campaign did nothing to redress this difference. Pasick et al. [19] suggest that other interventions in addition to mass media may be worthwhile, such as improving access to screening services, and tailored interventions based on barriers and motivators specific to low-SES groups and cultures. Determining whether additional strategies in combination with mass media are more effective with lower SES women should be a focus of future research. In addition, the campaign in the current study was designed to have broad appeal to all women; however, in future, a targeted campaign could be developed for women of low SES.

A general mass media campaign has been shown to have an effect at promoting cervical screening across all SES groups. In order to address some of the underlying inequalities in screening across lower SES groups, the impact of mass media in conjunction with other more specific interventions aimed at low-SES groups should be assessed. Findings from this line of enquiry will enable cervical screening programmes to make evidence-based decisions on how to enhance the positive effects that already result from mass media campaigns for women of all SES groups.

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### Conflict of interest statement

None declared.

### References

Mass media influences all socio-economic groups


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