Exposure to Sources of Heart Disease Prevention Information: Community Type and Social Group Differences

By John R. Finnegan Jr., K. Viswanath, Emily Kahn, and Peter Hannan

Community pluralism predicted both exposure to sources of heart disease prevention information and diversity of source exposure in three Upper Midwest cities (small, medium, large) over a ten-year period. Community differences in both outcomes narrowed, however. The study suggested that during the 1980s, the sheer amount of information about the topic of heart disease prevention and the proliferation of electronic media reduced typical community system and SES-based differences in exposure.

Exposure has longstanding conceptual importance in communication research based on the view that it is a contingent condition for some kind of communication effect to occur.[1] One approach argues that exposure is a social situational phenomenon in which individuals come into contact with messages in particular mass media and other channels of information.[2] Individuals may actively seek out certain messages, or they may be exposed to them unintentionally.[3] They may interact directly or indirectly with messages once or repeatedly. Contact may occur through single or multiple channels or through group and interpersonal networks.

Another approach, however, considers exposure as first a phenomenon of social systems. That is, social systems provide antecedent conditions that mediate exposure in the first place. Relatively more pluralistic community social systems provide greater numbers of channels and therefore potentially greater exposure opportunities than relatively less pluralistic communities. In addition, groups of higher socioeconomic status (SES) typically are more exposed to information sources of all kinds. It is this systemic view of exposure that concerns us here.

This study examined differences in exposure to channels of information about cardiovascular disease (CVD) prevention as a function of community social systems. Specifically, the study examined differences over time in self-reported exposure to media, group, and interpersonal CVD information sources among three communities of differing levels of pluralism and among groups of differing formal education (a key SES indicator).

Background

Minnesota researchers Tichenor, Donohue, and Olien have emphasized a systemic view of exposure particularly through their unique focus on differences in community social systems.[4] In their approach, communities

Finnegan, Kahn, and Hannan are with the Division of Epidemiology, School of Public Health, University of Minnesota, Minneapolis; Viswanath is with the School of Journalism at Ohio State University in Columbus. *This research was supported by the Minnesota Heart Health Program, Grant HL-25523 from the National Heart, Lung, and Blood Institute (NHLBI), National Institutes of Health, U.S. Department of Health and Human Services, Bethesda, Maryland.*

Journalism Quarterly
Vol. 70, No. 3
Autumn 1993
569-584
©1993 AEJMC

are considered as systems of power and influence with formal and informal functions for maintenance: management of conflict and competition, the allocation of resources, and the formation of public policy.[5] The distribution of information is central to these maintenance functions which are carried out through the interaction of subsystems including mass media and other institutions, organizations, and groups. Communities, however, differ in systemic characteristics that influence whether and to what extent people will be exposed to sources of information.[6] Two important characteristics include community pluralism and socioeconomic stratification.

Community Type and Exposure, Hypotheses 1-4: Community pluralism, characterized by community size and specialization of functions, influences the potential for exposure to information sources. The larger and more complex the community, the greater the availability of information sources of all kinds including those of media, institutions, and groups.[7] Power, leadership, institutions, and organizations are more specialized, diverse, and interdependent in larger compared to smaller communities.[8] Because of this greater diversity and interdependence, relatively more formal communication is required to inform and reconcile competing interests. Media systems and other formal communication channels therefore assume different roles in more pluralistic communities by providing information about the activities and perspectives of diverse, interdependent, and competing interests. In contrast, smaller communities are less specialized and differentiated.[9]

One would expect therefore that more pluralistic communities would afford generally greater opportunities for exposure to information of all kinds over time (particularly specialized information about health) than one would expect in a smaller community. This may occur in two ways. First, in a more pluralistic community, one may expect individuals to report exposure to a greater number of sources on a topic of interest, and second, exposure to a greater diversity of sources. These considerations lead to two hypotheses about the effect of pluralism on exposure:

H1: Exposure to CVD information sources over time will be higher in more pluralistic communities compared to less pluralistic communities;

H2: Diversity of exposure to CVD information sources over time will be higher in more pluralistic communities compared to less pluralistic communities.

Community pluralism may differentially affect exposure to specific types of sources. For example, more pluralistic communities give rise to greater diversity of groups and organizations and also more specialized communication channels meant to serve the needs of different groups. Electronic channels (particularly television), however, have become broadly available in communities of all levels of pluralism through cable and other newer technologies.[10] Small communities with relatively few local electronic channels may receive nearly the same number of channels as large metropolitan areas. These considerations lead to two additional hypotheses about the effect of community pluralism on exposure to specific information channels:

H3: Exposure to print and institutional CVD information sources over time will be higher in more pluralistic communities compared to less pluralistic communities;

H4: Exposure to electronic CVD information sources over time will be the same in communities regardless of level of pluralism.

Social Stratification and Exposure, Hypotheses 5-8: In addition to the effect of community pluralism, research in the "Knowledge Gap" tradition has demonstrated that there are longstanding socioeconomic differences in exposure to information sources. For example, as an SES indicator, formal educational achievement notably distinguishes groups in exposure and information-holding. Those with more education are more likely to be exposed to information sources of all kinds than their less educated counterparts. Although contingent conditions affecting the salience for specific topical information (e.g., community controversies)[11] and saturated information environments may temporarily narrow, eliminate, or even reverse these differences in some situations, the basic finding of relative group differences remains.[12]

Although there has not been as much study of patterns of health information source exposure as in public affairs topics, subgroup differences appear quite similar. In health, too, those with greater formal education tend to be more exposed to information sources than their less educated counterparts.[13] In light of these considerations, one would expect that greater formal education would predict both greater exposure to sources of CVD information and greater diversity of source exposure. We proposed the following hypotheses about the effect of education on exposure to CVD information sources:

H5: Exposure to CVD information sources over time will be higher among groups with more formal education compared to groups with less formal education;

H6: Diversity of exposure to CVD information sources over time will be higher among groups with more formal education compared to groups with less formal education.

For the same reasons, we may expect that groups with greater formal education also would report greater exposure to print and institutional sources of CVD information. However, the same may not be true of electronic sources (mainly television). Research has shown, for example, that differences between higher and lower SES groups in time spent viewing television are largely nonsignificant, although there may be SES differences in content preference and learning effects.[14] We proposed:

H7: Exposure to print and institutional CVD information sources over time will be higher among groups with more formal education compared to groups with less formal education;

H8: Exposure to electronic CVD information sources over time will be the same among education groups.

Methods

The study was conducted as part of the Minnesota Heart Health Program (MHHP), a federally funded research and demonstration project to prevent CVD in Upper Midwest communities. A description of the study's full design is available elsewhere.[15] To contrast differences in exposure

TABLE 1

Indicators of Community Pluralism

	City population	County population	Per capita income	Local daily newspapers	Local weekly newspapers	Local television VHF/UHF	Local radio AM/FM	Cable system
Small city	25,075	47,132	$9,602	1	0	0	5	yes
Regional city	109,435	127,000	$14,526	1	0	3	13	yes
Suburb	47,132	472,683	$17,630	2	1	7	31	no

Sources:
U.S. Census, 1980.
Editor & Publisher International Yearbook, 1980 (New York, NY: E&P Company)
Broadcasting/Cable Yearbook '80 (Washington D.C.: Times-Mirror Company)

based on community structure, our analysis focused on three communities that served as the study's references to monitor secular trends over a period of ten years from 1980 through 1990. The cities represented three types of communities of different size and pluralism: one relatively homogeneous, small independent city (1980 population = 25,075), one larger regional center (1980 population = 109,435), and one heterogeneous suburb (1980 population = 47,132) part of a large metropolitan area.

To validate differences in community pluralism, we compared city and county population, per capita income, and the relative size of each community's media system as indicators (Table 1).[16] Media system comparisons included the availability of daily and weekly newspapers, local television and radio stations, and the presence of a cable system. The suburb, part of a large metropolitan area (population = 2.4 million), possessed the largest, most differentiated media system, indicating greater availability of communication channels. The small independent city possessed the fewest media channels, indicating the least availability of information sources.

Data for this analysis came from twenty-two cross-sectional samples (N=9,786) conducted in the three reference cities during the ten-year period. Specifically, each community was surveyed every year between 1980 and 1984. Additional surveys were conducted on a staggered basis between 1985 and 1990. Table 2 displays the sequenced cross-sectional samples and their

TABLE 2

Cross Sectional Samples

(N=9,786)

	80-81	81-82	82-83	83-84	84-85	85-86	86-87	87-88	88-89	89-90
Small City (N)	451	543	356	556	356	0	556	550	0	0
Regional city (N)	531	338	318	334	0	559	0	526	539	0
Suburb (N)	521	318	318	336	311	0	460	0	527	482
TOTALS (N)	1503	1199	992	1226	667	559	1016	1076	1066	482

TABLE 3

Sources of Information about Heart Health

MASS MEDIA	SMALL MEDIA†	INTERPERSONAL	GROUP
Newspaper	Book	Doctor/HP	School/class/lecture
Television	Pamphlet	Family†	Social/recreational group
Radio	Sign/billboard	Friend†	Self-help clinic/group
Magazine			

†Not included in analysis

sizes in each community. Samples were drawn through a two-staged cluster procedure.[17] Prior to the first survey, census tract blocks were randomly selected in each city. Selected blocks were then enumerated and clusters of households (adjacent groups of five households) were randomly selected from within blocks. The number of clusters was equal to the ratio of expected versus enumerated households in each block. All households in the selected clusters were eligible for survey. Within households, interviewers randomly selected a single age-eligible adult (twenty-five to seventy-four years old).[18] Survey response rates ranged from 73 percent -85 percent with the exception of one (62 percent).

Exposure data were obtained by asking respondents to recall any messages they had seen, heard, or read about CVD prevention "in the past few months," and the sources of the messages (open-ended).[19] Interviews were conducted in respondents' homes, part of a larger schedule of questions about CVD prevention knowledge, beliefs, behaviors, and sociodemographic measures. To aid recall, respondents were given a cue card listing 13 specific sources from which they may have received CVD prevention information (Table 3).

Dependent Measures: For dependent measures, we used only the source responses obtained with the instrument. As displayed in Table 3, possible responses included mass media, small media, interpersonal, and group sources. From these we constructed several measures as follows:

Exposure to CVD information sources was the total of information sources respondents recalled including the same sources mentioned more than once (possible range = 0-26).[20]

Exposure Diversity was constructed from respondents' recall of each different source type mentioned at least once (possible range = 0-13).[21]

Exposure to Print Sources of CVD Information was measured as total print sources recalled including the same sources mentioned more than once (possible range = 0-4).

Exposure to Institutional Sources of CVD Information was constructed by combining (from Table 2) doctors and health professionals, and group sources.This also was measured as the total of all such sources, including the same sources mentioned by respondents more than once (possible range = 0-8).

Exposure to Electronic Sources of CVD Information was constructed from responses in the source categories of television and radio, measured as total electronic sources recalled including the same sources mentioned more than

once (possible range = 0-4).

Analysis: To test hypotheses, we used analysis of covariance (ANCOVA) in two steps, with the SAS General Linear Modeling (GLM) procedures.[22] In the first step, individual level data were used to create means for each city at each timepoint. The reason for analyzing city-means is the extra variation found in MHHP city-surveys, described in an earlier study.[23] Methods used to gather these data suggested that survey-to-survey variability that leads to the significance of an interaction term can be attributed largely to an interviewer effect, absent a significant community main effect. We have therefore used the city as the unit of analysis both to minimize the chance of committing a Type I error (i.e., finding significance where there is none) and to test for the effect of community structure.

Because we hypothesized that there would be significant differences in the dependent measures across education groups, the data were stratified into three education categories: (1) low: less than high school; (2) medium: high school graduate/vocational training, and (3) high: some college education or more.[24] The first step in analysis thus provided a total of sixty-six observations (means for three cities x three education groups x ten timepoints) for further analysis. The number of data points does not equal ninety because of empty cells in the design (after 1984, cross-sectional surveys were conducted only in selected communities each year; Table 2).[25]

In the second step, model components included the following main terms: community type (small city, regional city, suburb), time (ten surveys from 1980 through 1990), and education (low, medium, and high). Each model also included two second order interaction terms. *Time x community pair* was used to examine whether time trends interacted differently with community type; and *time x education* was used to examine whether time trends interacted differentially with education groups.[26]

Results

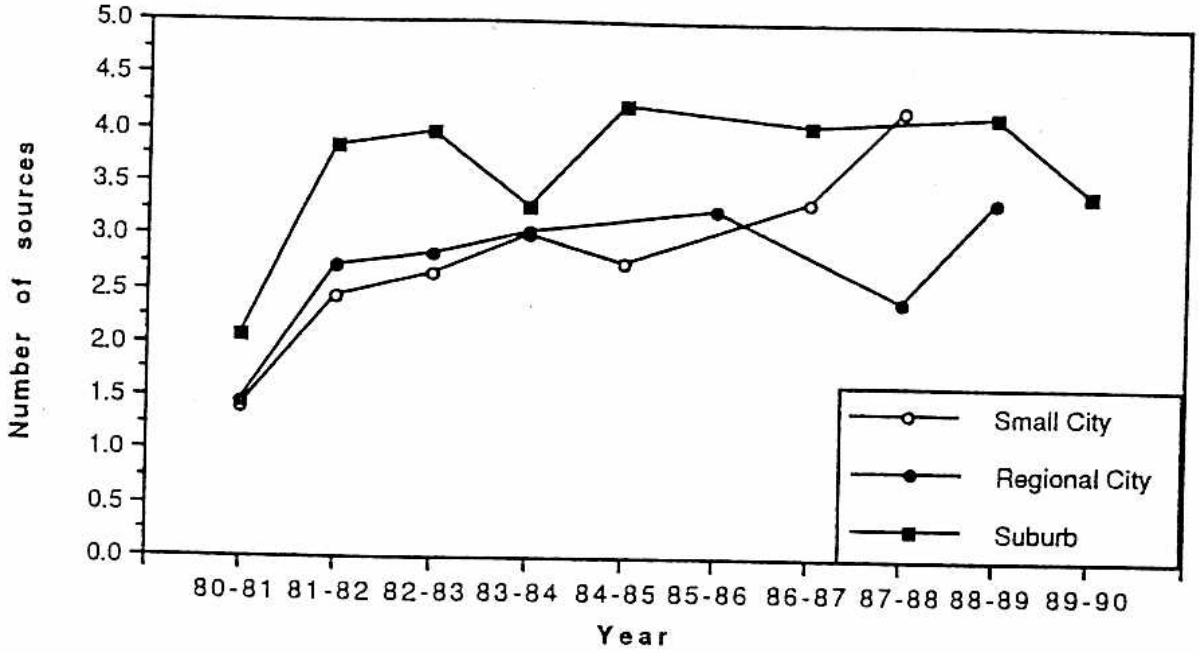
Exposure and Community Pluralism, Hypotheses 1-4: Our first hypothesis proposed that exposure to CVD information sources (total sources recalled) over time would be higher in more pluralistic communities compared to relatively less pluralistic communities.[27] Figure 1 displays adjusted means for sources of CVD information recalled in each community over time. The model was significant (model $F[41,24] = 34.71$, $p = .0001$), adjusted $R^2 = .955$.[28] Significant terms included the main effects of community structure ($F[2, 24] = 6.51$, $p = .015$)[29] and time ($F[9,24] = 5.37$, $p = .007$). Adjusted means showed that the community effect favored the suburb. That is, exposure to CVD information sources was highest in the more pluralistic suburb, with lower exposure in the regional and small cities. This supported the first hypothesis (H1). Similarly, adjusted means showed that the time main effect was essentially linear and positive, with exposure increasing rapidly in the first three years and then more gradually (with fluctuations) through 1990.

The second order term *time x community* ($F[10, 24] = 14.02$, $p = .0001$) was also significant, suggesting that community structure differentially affected the time trend. Regression lines plotted for each community indicated that while the suburb had the greatest exposure, the small and regional cities showed greater increases over time.

The second hypothesis proposed that diversity of respondents' CVD information sources over time would be higher in relatively more pluralistic communities. Figure 2 displays adjusted means for source diversity. The model was significant (model $F[41,24] = 30.79$, $p = .0001$), adjusted $R^2 = .949$. Significant terms included the main effects of community ($F[2,24] = 10.08$, p

FIGURE 1

Exposure to CVD Information Sources in Three Communities of Differing Pluralism, 1980-90 (adjusted for age, gender, and education)



Model F[41,24] = 34.71, p = .0001, adj. R-square = .955
Community F[2,24] = 6.51, p = .015
Time F[9,24] = 5.37, p = .007
Interaction F[10,24] = 14.02, p = .0001

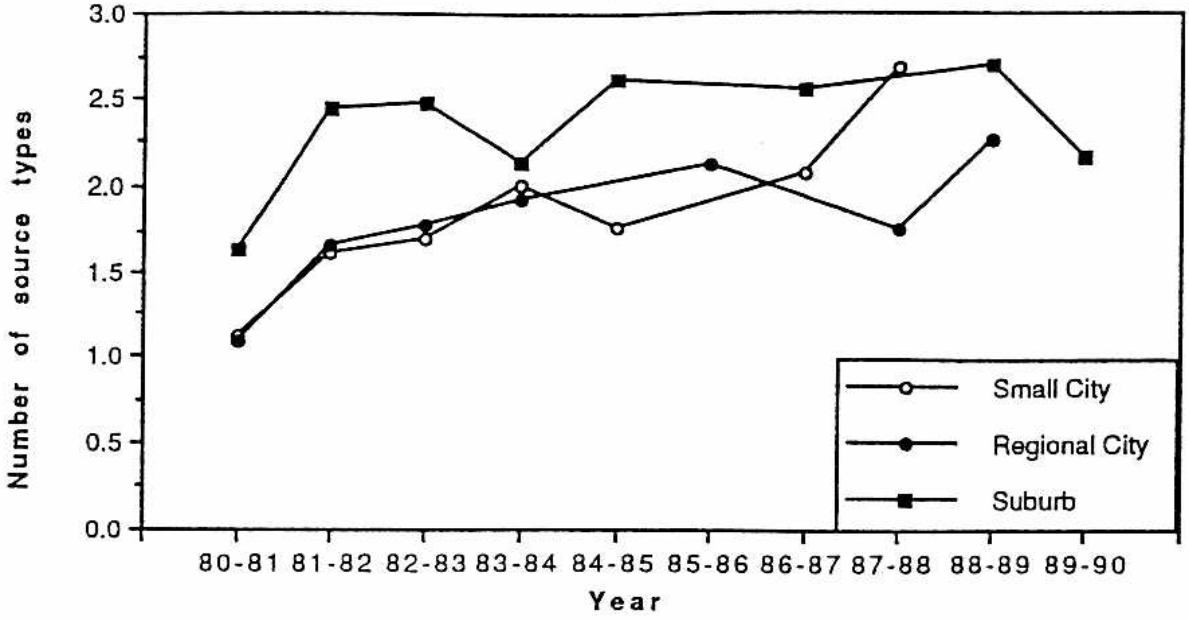
= .004); and time (F[9,24] = 5.71, p = .006). Adjusted means showed that the community structure effect favored the suburb. Exposure to diverse information sources about CVD was higher in the suburb than in the relatively less pluralistic small and regional cities. This supported the second hypothesis (H2). Source diversity increased during the period. It was lowest in 1980-1981, and higher in all communities by 1989-90.

The significance of the second order term *time x community* (F[10,24] 9.28, p = .0001) indicated that community structure affected the general time trend. Source diversity increased most in the small city followed by the regional city and the suburb. We also expected that community structure would differentially impact exposure to specific channels. In our third hypothesis, we predicted that exposure to print and institutional sources would be higher in the suburb than in the less pluralistic small and regional cities. Figure 3 displays adjusted means for print sources recalled in each community. The model was significant (model F[41,24] = 20.60, p = .0001), adjusted R^2 = .925. Significant terms included the main effects of community (F[2,24] = 11.44, p = .003) and time (F[9,24] = 2.98, p = .052). Adjusted means showed that the community structure effect favored the suburb as predicted. That is, exposure to print sources of CVD information was higher in the more pluralistic suburb than in the less pluralistic small and regional cities. The time main effect was essentially linear and positive, although only marginally significant (Figure 3).

The significance of the second order interaction term *time x community structure* (F[10,24] = 5.77, p = .0002) indicated that the time trend interacted differentially with the communities. As with total source exposure, regres-

FIGURE 2

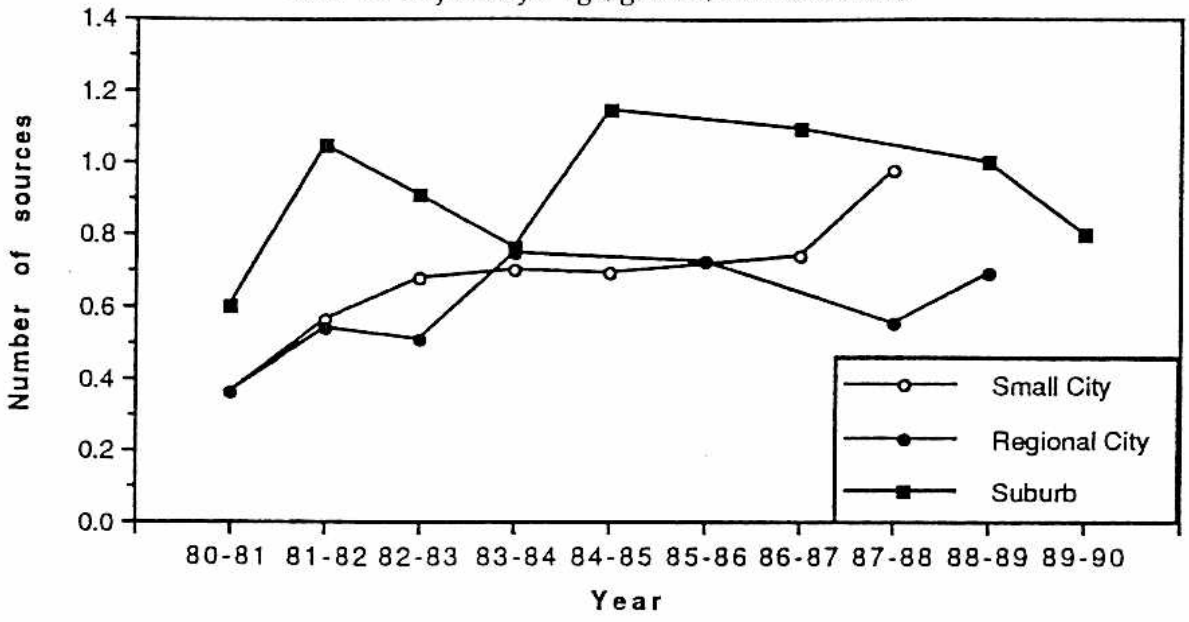
Diversity of CVD Information Sources Exposure in Three Communities of Differing Pluralism, 1980-90 (adjusted for age, gender, and education)



Model F[41,24] = 30.79, p = .0001, adj. R-square = .949
Community F[2,24] = 10.08, p = .004
Time F[9,24] = 5.71, p = .006
Interaction F[10,24] = 9.28, p = .0001

FIGURE 3

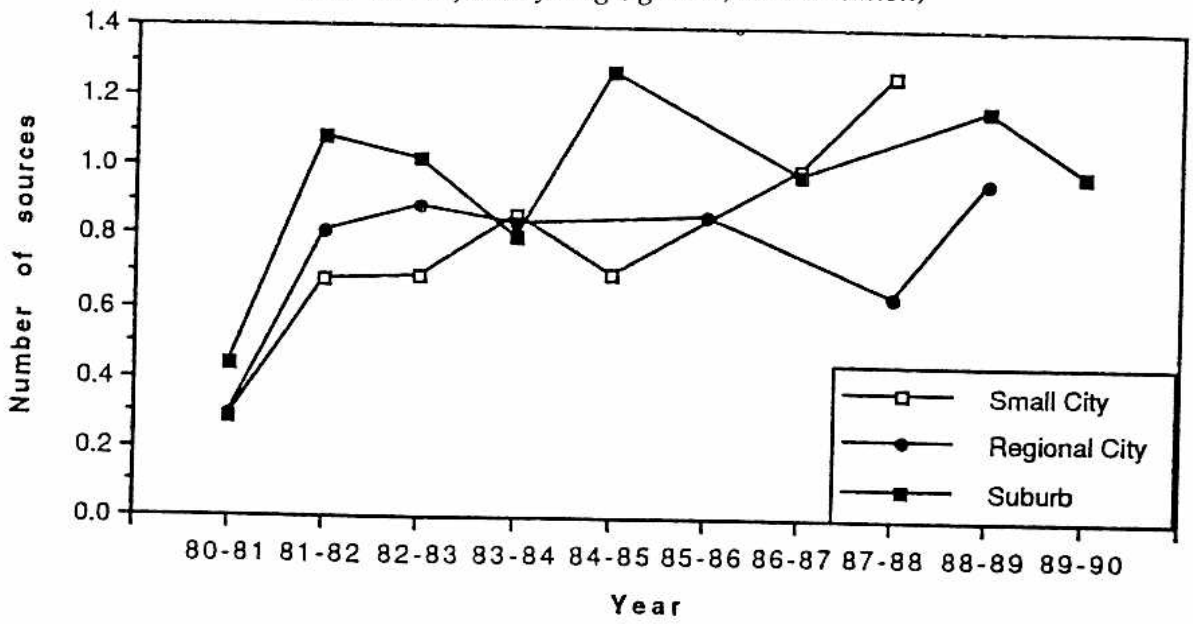
Exposure to Print CVD Information Sources in Three Communities of Differing Pluralism, 1980-90 (adjusted for age, gender, and education)



Model F[41,24] = 20.60, p = .0001, adj. R-square = .925
Community F[2,24] = 11.44, p = .003
Time F[9,24] = 2.98, p = .052
Interaction F[10,24] = 5.77, p ≤ .002

FIGURE 4

Exposure to Electronic CVD Information Sources in Three Communities of Differing Pluralism, 1980-90 (adjusted for age, gender, and education)



Model F[41,24] = 13.70, p = .0001, adj. R-square = .889
Community F[2,24] = 1.93, p = .196
Time F[9,24] 4.58, p = .013
Interaction F[10,24] = 8.65, p = .0001

sion lines showed the small city with the greatest rate of increase followed by the regional city and the suburb. This partially supported the third hypothesis (H3).

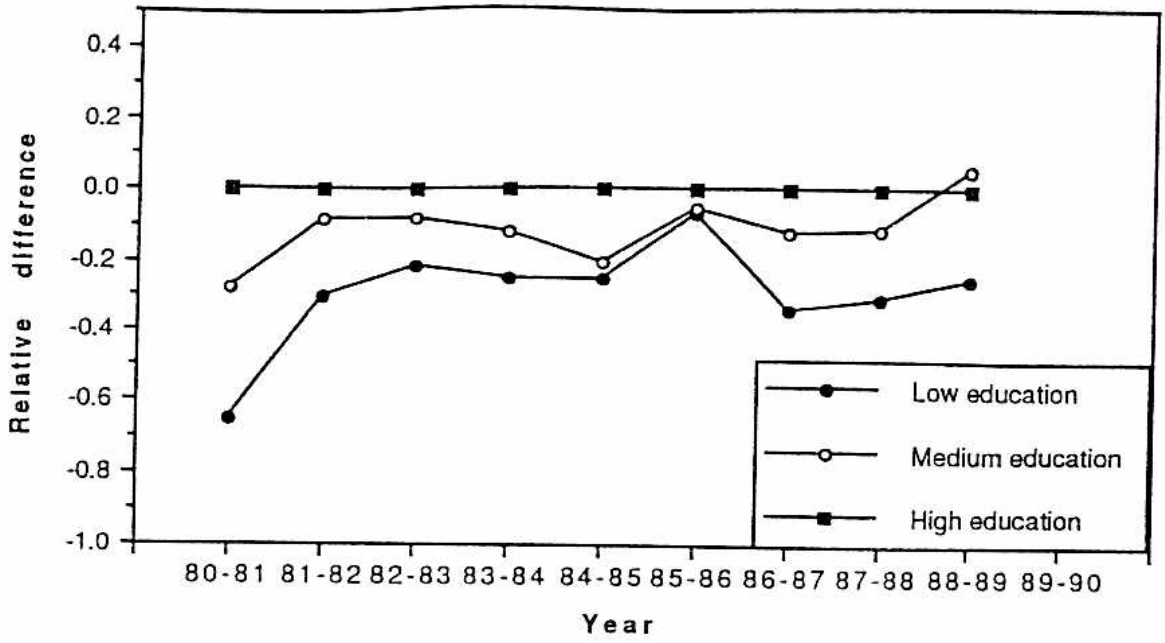
The third hypothesis also predicted that exposure to institutional sources would be higher in more pluralistic communities. While the model was significant (model $F[41, 24] = 3.89$, $p = .0004$), adjusted $R^2 = .645$, the main effect of community structure was not ($F[2, 24] = 2.64$, $p = .12$), as was the main effect of time ($F[9,24] = 2.24$, $p = .113$). Exposure to institutional sources of CVD information thus was not influenced by community pluralism nor did it change significantly over time. This did not support the third hypothesis.

Figure 4 displays adjusted means for electronic sources of CVD information. The model was significant (model $F[41, 24 = 13.70$, $p = .0001$), adjusted $R^2 = .889$. The main effect of time was significant $F[9,24] = 4.58$, $p = .013$), but the main effect of community structure was not ($F[2,24] = 1.93$, $p = .196$). Although each community showed increasing exposure to electronic sources, there was little difference based on community pluralism. This supported the fourth hypothesis (H4).

Exposure and Education Group Differences: Hypotheses 5-8: The fifth hypothesis (H5) predicted that exposure to CVD information sources would be higher among respondents with more formal education compared to those with less.[30] Education ($F[2,24] = 20.34$, $p = .0002$) was a significant main effect with adjusted means favoring the highest educated group. Those with some college education or more reported exposure to the greatest number of sources, followed by high school graduates, and those with less than a high

FIGURE 5

Relative Differences Among Education Groups in CVD Information Source Exposure Over Time (High Education Group Held Constant at 0)



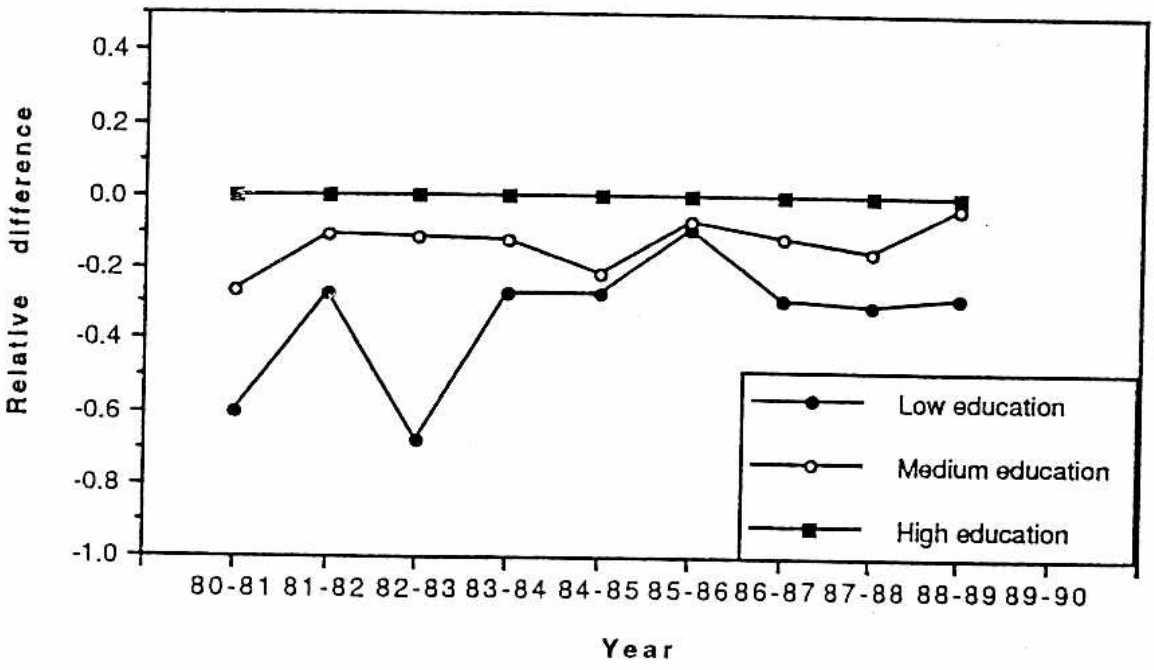
Education F[2,24] = 20.34, p = .0002
Education x Time F[18,24] = 3.79, p = .0014

school education. This supported the fifth hypothesis (H5). However, the significance of the second order term *time x education* (F[18,24] = 3.79, p = .0014) indicated that time affected education groups differentially on this measure. To examine this, we plotted model parameter estimates of the effect of *time x education*. In Figure 5, change in the reported source exposure of the two lowest education groups is shown in relation to the highest education group (some college or more) which is held constant at 0. The figure illustrates that over time, the two less educated groups increased in source exposure in relation to the highest educated group. While large differences existed among the groups in the 1980-81 period, these diminished over time. By 1989-90, differences had narrowed significantly. Despite increasing source exposure, the least educated group continued to report the least exposure by 1989-90 relative to the other groups.

The sixth hypothesis (H6) proposed that diversity of exposure to CVD information sources over time would be higher among groups with more formal education compared to those with less formal education. Education was a significant main effect in the model (F[2,24] = 27.61, p = .0000). Adjusted means showed that the lower education groups (less than high school; high school/vocational) were significantly lower than the highest education group (some college or more) in support of the hypothesis. The *time x education* interaction effect was also significant (F[18,24] = 4.02, p = .0009) indicating that time trends and education groups interacted differentially. As above, we plotted model parameter estimates of the effect of *time x education*. In Figure 6, change in the reported source exposure of the two lowest

FIGURE 6

Relative Differences Among Education Groups in Diversity of Exposure to CVD Information Sources (High Education Group Held Constant at 0)



Education F[2,24] = 27.61, p = .0000
Education x Time F[18,24] = 4.02, p = .0009

education groups is shown in relation to the highest education group (some college or more) which is held constant at 0. The lowest education group, while consistently lowest in source diversity over time, showed the greatest gain relative to the highest education group. The middle education group (high school/vocational) also showed a modest gain relative to the highest education group. Over the ten year period, differences between the education groups narrowed significantly.

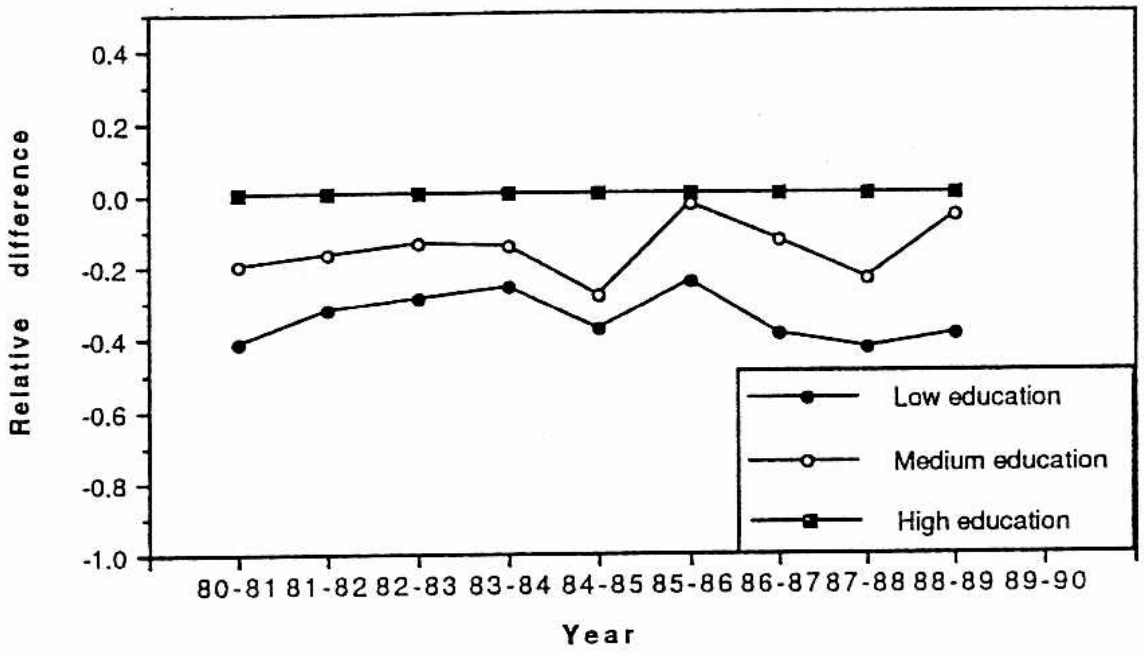
The seventh hypothesis (H7) predicted that exposure to print and institutional sources of CVD information would be greater among higher education groups. In partial support of the hypothesis, the model showed a significant main effect for education (F[2,24] = 61.11, p = .0000). Adjusted means showed that the highest education group reported the greatest exposure to print sources, followed in order by the high school/vocational and less than high school groups. The lowest education group reported lowest exposure to print sources. The *time x education* interaction (F[18,24] = 1.88, p = .074) was not significant, however, indicating that educational differences in exposure to print sources did not change over time (Figure 7).

In additional support of the hypothesis, education also predicted exposure to institutional sources of CVD information (F[2,24] = 39.32, p = .0000). Differences among the groups did not significantly change over time (*time x education* F[18, 24] = .53, p = .913).

Finally, as predicted, education level did not predict exposure to television as a source of CVD information (F[18,24] = 0.69, p = .514; no figure included). This supported the final hypothesis (H8).

FIGURE 7

Relative Differences Among Education Groups in Exposure to Print CVD Information Sources (High Education Group Held Constant at 0)



Education F[2,24] = 61.11, p ≤ .0000
Education x Time F[18,24] = 1.88, p = .074

Discussion

Although community pluralism predicted exposure to CVD information sources and source diversity (H1 and H2), community differences in both narrowed during the ten-year period. Differences were strongest in the hypothesized direction for the first three years, but declined thereafter as the less pluralistic communities gained. What may account for this changing effect of pluralism on exposure?

One possibility is that these communities changed in pluralism relative to one another during the period. The speculation here is that relative differences among the communities may have narrowed with a parallel narrowing of source and exposure diversity differences. However, population changes showed that the communities remained similar in relation to one another between 1980 and 1990.[31] We also looked at changes in the communities' mass media systems during the period. Only cable television availability increased substantially during the period. In fact, all communities showed large increases in reporting electronic sources for CVD information; there were no community differences as proposed (H4); and no other CVD information source was reported as often.[32] These findings suggested increased reliance on television as a source of health information from 1980 to 1990.

A second speculation has to do with growth in the volume of CVD information. That is, propelled by government, medical, and scientific interests at national, state, and local levels, heart disease increased in salience to

become a major issue on the nation's health agenda. More information about CVD appeared in more channels during the period.[33] The speculation here is that growth in the availability of CVD information would likely penetrate more pluralistic communities first and less pluralistic communities later.

Although we proposed that community pluralism would predict increased exposure to print and institutional CVD information (H3), we found support only for print. Community differences favored the suburb but also suggested that the effect of pluralism on exposure to print sources was relatively stable during the decade: each community showed an increase overall but there were no major changes in print availability. Lack of community difference in institutional source exposure suggested that use of institutional sources may be influenced more by SES than mere availability.

The effect of education on exposure and source diversity also received support: greater education predicted higher exposure (H5) as well as higher source diversity (H6). However, our findings also showed that as in the case of community pluralism, the predictive strength of education declined over time. Education-based differences were evident throughout, but the least educated groups gained the most relative to the higher education groups. A more refined view is evident in education-based exposure to specific sources. Education-based differences in exposure to print and institutional media (H7) did not narrow significantly. All groups reported increased exposure to print sources, but education differences in institutional source exposure remained virtually unchanged (high education groups appeared to recall institutional sources more often). All education groups reported significant increases in electronic source exposure (H8), but there were no significant education group differences.

Our earlier speculations also apply. Local changes in media systems (mainly cable television) may account for some increased exposure, but it also appears that changes in CVD-related content has increased within existing channels. The effect of this rising public agenda may argue for a long-term process such as suggested by Donohue, Olien, and Tichenor in a recent study of Knowledge Gaps and smoking behavior.[34] The study found some indirect support for the proposition that as certain knowledge approaches universal acceptance, SES-based differences diminish. Although our study did not address knowledge per se, it suggested that the sheer volume of information has very likely narrowed community and SES-based exposure differences that are important bases for knowledge change.

NOTES

1. William J. McGuire, "Theoretical Foundations of Campaigns," in *Public Communication Campaigns*, 2d (Beverly Hills, Calif.: Sage, 1989): 43-65.

2. Richard L. Allen and L. Waks, "The Dimensionality of Mass Media Exposure," paper presented at the annual meeting of the International Communication Association (ICA), Chicago, May, 1986; Charles T. Salmon, "Message Discrimination and the Information Environment," *Communication Research* 13 (July 1986): 363-372.

3. Peter Clarke and F. Gerald Kline, "Media Effects Reconsidered: Some New Strategies for Communication Research," *Communication Research* 1 (1974): 224-240.

4. Phillip J. Tichenor, George A. Donohue, and Clarice N. Olien, *Community Conflict and the Press* (Beverly Hills, Calif.: Sage, 1980); Jack M. McLeod

and Jay Blumler, "The Macrosocial Level of Communication Science," in *Handbook of Communication Science* (Beverly Hills, Calif.: Sage, 1987): 271-324.

5. Michael Aiken, "The Distribution of Community Power: Structural Bases and Social Consequences," in *The Structure of Community Power*, (New York: Random House, 1970), 487525; S.N. Eisenstadt and A. Schachar, *Society, Culture and Urbanization* (Newbury Park, Calif.: Sage, 1986).

6. Tichenor, Donohue, and Olien, *Community Conflict and the Press.*

7. Tichenor, Donohue, and Olien, *Community Conflict and the Press.*

8. J. Q. Wilson, "Planning and Politics: Citizen Participation in Urban Renewal," in *Perspectives on the American Community*, (Skokie, Ill.: Rand-McNally, 1973); Tichenor, Donohue, and Olien, *Community Conflict and the Press;* Clarice N. Olien, George A, Donohue, and Phillip J. Tichenor, "Structure, Communication and Social Power: Evolution of the Knowledge Gap Hypothesis," *Massacommunicatie* 10 (June 1982): 81-87.

9. Tichenor, Donohue, and Olien, *Community Conflict and the Press;* Steven H. Chaffee and D.G. Wilson, "Media Rich, Media Poor: Two Studies of Diversity in Agenda-holding," *Journalism Quarterly* 53 (1976): 466-476.

10. Benjamin M. Compaine, "The Expanding Base of Media Competition," in *Mass Communication Review Yearbook*, Vol. 6 (Newbury Park, Calif.: Sage, 1987): 553-568.

11. B. K. L. Genova and Bradley S. Greenberg, "Interests in News and the Knowledge Gap," *Public Opinion Quarterly* 43 (1979): 79-89; James S. Ettema and F. Gerald Kline, "Deficits, Differences and Ceilings: Contingent Conditions for Understanding the Knowledge Gap," *Communication Research* 4 (1977): 179-202.

12. K. Viswanath and John R. Finnegan, Jr., "Knowledge Gap Hypothesis: Twenty Years Later," paper presented at the annual meeting of the International Communication Association, Chicago, Ill., May, 1991.

13. Serena Wade and Wilbur L. Schramm, "The Mass Media as Sources of Public Affairs, Science and Health Knowledge," *Public Opinion Quarterly* 33 (1969): 197-209; F. Williams, H. S. Dordick, and F. Horstmann, "Where Do Citizens Go for Information," *Journal of Communication* 27 (1977): 95-99; W. R. Wright, "Mass Media as Sources of Medical Information," *Journal of Communication*, 3 (1975): 171-173; E. A. Yetley and C. Roderuck, "Nutritional Knowledge and Health Goals of Young Spouses," *Journal of American Dietetic Association*, 77 (1980): 31-41; Carolyn A. Stroman and Richard Seltzer, "Mass Media Use and Knowledge of AIDS," *Journalism Quarterly* 64 (Winter 1987): 881-887; John R. Finnegan Jr., K. Viswanath, Brenda Rooney et al., "Predictors of Knowledge about Healthy Eating in a Rural Midwestern U.S. City," *Health Education Research: Theory & Practice* 5 (1990): 421431.

14. Robert Kubey and Mihaly Csikszentmihalyi, *Television and the Quality of Life: How Viewing Shapes Everyday Experience* (Hillsdale, N.J., Lawrence Erlbaum Associates, 1990): 71-73; James G. Webster, "Television Audience Behavior: Patterns of Exposure in the New Media Environment," in *Media Use in the Information Age: Emerging Patterns of Adoption and Consumer Use* (Hillsdale, N.J., Lawrence Erlbaum Associates, 1989): 210-213; Robert J. Griffin, "Energy in the Eighties: Education, Communication and the Knowledge Gap, *Journalism Quarterly* 67 (1990): 554-566; Dan Drew and David Weaver, "Media Attention, Media Exposure, and Media Effects," *Journalism Quarterly* 67 (1990): 740-748.

15. David Jacobs, Jr., Russell V. Luepker, Maurice B. Mittelmark et al., "Community-wide Prevention Strategies: Evaluation Design of the Minnesota Heart Health Program," *Journal of Chronic Disease* 39 (1986): 775-788;

Maurice B. Mittelmark, Russell V. Luepker, David R. Jacobs Jr. et al., "Community-wide Prevention of Cardiovascular Disease: Education Strategies of the Minnesota Heart Health Program," *Preventive Medicine* 15 (1986): 1-17.

16. Clarice Olien, Phillip Tichenor, and George Donohue, "Structure, editor characteristics, and reporting of conflict, 1965 and 1985," paper presented at the annual meeting of the Midwest Association For Public Opinion Research (MAPOR), November 22, 1986; C. N. Olien, P. J. Tichenor, G.A. Donohue, K.L. Sandstrom, and D.M. McLeod, "Community Structure and Editor Opinions about Planning, *Journalism Quarterly* 67 (Spring 1990): 119-127.

17. Leslie Kish, *Survey Sampling* (New York: John Wiley & Sons, 1965).

18. David R. Jacobs et al., "Community-wide Prevention Strategies: Evaluation Design of the Minnesota Heart Health Program."

19. A full description of the instrument and an analysis of response patterns is available in John R. Finnegan Jr., K. Viswanath, Peter Hannan, Rita Weisbrod, and David R. Jacobs Jr., "Message Discrimination: A Study of its Use in a Campaign Research Project," *Communication Research* 16 (1989): 770-792.

20. This permitted us to model the effect of community type and social stratification over time on a summed measure of sources recalled.

21. For example, if a respondent mentioned receiving CVD information from television *and* from a family member, she would receive a diversity score of two, regardless of how many times she repeated each channel as a source of information.

22. SAS Institute Inc., *SAS/STAT® User's Guide*, Version 6, Fourth Edition, Vol. 2 (Cary, N.C.: SAS Institute Inc., 1989).

23. Finnegan, Viswanath, Hannan, Weisbrod, and Jacobs, "Message Discrimination: A Study of Its Use in a Campaign Research Project."

24. Such a stratification procedure allowed each variable and covariate to interact with the separate levels of education. This preserved differences in the outcome measures which are based on education differences, avoiding the possibility that these education differences will disappear when another variable (e.g., age) is covaried. Means were adjusted within the strata by covarying at the individual level for the effects of gender, age, and education differences, as well as an *age x education* interaction. This equalized the effect of these variables on the dependent measures, allowing for the isolation of the systemic effects of community structure and socioeconomic status (SES) as measured by education.

25. The SAS GLM procedure handles the problem of missing cells by allowing for estimation of effects from the data which are given.

26. Thus, outcome = Mean + C + E + T + TC + TE + error; where C = community type; E = education stratum; and T = time. The F-statistics and their associated probabilities rely on the error being normally distributed. However, the analysis is reasonably robust against this assumption as long as the error is at least symmetric and of approximately the right tail behavior (kurtosis). We used the square-root transformation on the dependent variables to approximate symmetry. However, means reported in the accompanying figures have been re-transformed to their original scales.

27. Because time is considered to be a random effect (i.e., the study years cannot be exactly reproduced in another study), the main effects for community structure and time were examined in relation to the *time x community* interaction. This deflated the F values and was therefore a more conservative

estimate of significance.

28. Where:

$$(1-R^2adj) = \frac{N-1}{N-p}(1-R^2)$$

29. We have used $p \leq .05$ as the acceptable significance level.

30. As in the models examining the main effect of community pluralism, the main effect of education was examined in relation to the interaction of education x time. Doing so allowed for the fact that the community conditions at a given time cannot be recreated at a different time and gives a more conservative estimate of significance.

31. For example, from 1980 to 1990, population in the small city increased a little more than 1 percent (from 25,075 to 25,399) but decreased in the regional city by about 8 percent (109,435 to 100,814) and in the suburb by about 7 percent (47,132 to 43,797).

32. In the suburb, a cable system was first established in 1983. In the other two communities, cable systems existed long before 1980, but expanded in numbers of channels from only a few in 1980 to more than two dozen by 1990 including many national news, information, and premium channels. By 1990, cable systems in each community were approximately similar in channel capacity and availability.

33. B. Schucker, J. T. Wittes, N. C. Santanello, S. J. Weber, D. McGoldrick, K. Donato, A. Levy, and B. Rifkind, "Changes in Cholesterol Awareness and Action: Results From National Physician and Public Surveys," *Archives of Internal Medicine* 151 (1991): 666-673; B. Schucker, K. Bailey, J. T. Heimbach, M. E. Mattson, J. T. Wittes, C. M. Haines, D. J. Gordon, J. A. Cutler, V. S. Keating, R. S. Goor, and B. Rifkind, "Change in Public Perspective on Cholesterol and Heart Disease: Results From Two National Surveys," *Journal of the American Medical Association* 258 (1987): 3521-3526; M. Niknian, R. C. Lefebrve, and R. A. Carleton, "Are People More Health Conscious? A Longitudinal Study of One Community," *American Journal of Public Health* 81 (1991): 203-205.

34. George A. Donohue, Clarice N. Olien, and Philip J. Tichenor, "Knowledge Gaps and Smoking Behavior," paper presented to the annual conference of the American Association for Public Opinion Research (AAPOR), Lancaster, Pa., May 19, 1990.