Collecting and analyzing organizational level data for health behavior research

Introduction
While health behavior researchers most often address issues of individual behavior change, increasingly organizational questions are being asked. In conducting organizational research an important issue concerns how to collect and analyze organizational level data. Since most health behavior research uses individuals as the unit of analysis, researchers often are inexperienced in dealing with organizational level analyses. The purpose of this Editorial is to highlight the influence of sampling and data aggregation on organizational level analysis.

Types of organizational level questions that can be asked
In conducting organizational level research, while we collect data from individuals, the questions we seek to answer are about organizational policy (e.g. does the organization prohibit smoking), organization processes (e.g. how certain decisions are made), organizational activities (e.g. health promotion programs offered by worksites), relationships between organizational levels (e.g. how well staff feel they are treated by management), relationships between the organization and the community, organizational culture and funding.

Organizational levels
Figure 1 is a diagram that illustrates one way of conceptualizing the type of organizations most frequently studied by health behavior researchers (Steckler et al., 1987). In this framework an organization can be conceptualized as consisting of four internal and two external levels. The internal levels are: (1) policy makers (e.g. health department directors), (2) administrators/managers (e.g. heads of organizational sub-units such as health education units of local health departments), (3) program staff (individuals who provide direct client services or the equivalent) and (4) clients. Two important levels are outside an organization: (1) funders (individuals or organizations that fund programs operated by an organization, e.g. CDC funds many local health departments to conduct specific programs) and (2) the community.

This conceptualization suggests that for any given question responses may vary according to which organizational level or levels are sampled, and that where a person is placed in an organization may affect how he or she perceives certain aspects of organizational activity and culture. Moreover, it is reasonable to expect that individuals within one organizational level may not be familiar with all the issues at another organizational level. This is particularly true for large organizations.

Organizational level sampling strategies
Despite possible differences among organizational levels, the most common research strategy in organizational research is to sample one key person in each organization that is to be studied. Most frequently it is an administrator. This organizational level is used because people in these positions often have the widest organizational view. Usually, they are knowledgeable about policy issues, organizational processes and often are familiar enough with a given program to answer questions about it. For instance, in a study of staff stress in 51 AIDS prevention and service organizations, Janz et al. (1995) had project directors complete an organizational questionnaire. A variation of the one key person sampling strategy is for the researcher to...
send a survey to an organization and allow the organization to choose the most knowledgeable person to respond. This strategy was used by Robbins and Backstrom (1994) in a study of the role of state health departments in formulating AIDS policies.

The advantage of the one person per organization sampling strategy is that the data are analyzed just like a survey of individuals, and all of the data reduction, data analysis and statistical procedures that are commonly used by health behavior researchers can be applied. The disadvantage of this sampling strategy is that only one person's perspective about organizational issues is acquired. Depending on the nature of the questions asked, this sampling procedure could introduce considerable bias into an organizational study.

The alternative to sampling only one person is to sample more than one person in a given organization. However, once multiple people within an organization are sampled a number of methodological questions arise. For instance, assume that a number of organizations have been surveyed about a similar program they each operate; also assume that several people in each organization representing different organizational levels have been surveyed. How might the results of the survey be analyzed? On the surface, it seems that the answer is obvious; the data for each organization should be averaged. The unit of analysis becomes the organization and the sample size is the number of organizations. The data points are the average scores for each question, each scale or the equivalent. This approach creates a loss of statistical power since the degrees of freedom drop from the number of individuals surveyed to the number of organizations and variance is increased due to individual differences within each organization. Such an averaging procedure was used by Crump et al. (1996) in a study of organizational level variables on employee participation in worksite health promotion programs.

The Data-based Intervention Research Study (DBIR)

The DBIR was initiated and funded by the National Cancer Institute (NCI) to translate cancer prevention and control science into public health practice. To accomplish this goal NCI funded 22 state health departments over a 7 year period. In order to be funded, each state health department was required to conduct four phases of activity: (1) analyze relevant data, (2) use these data to develop a state cancer control plan and an implementation plan for high priority intervention areas, (3) implement interventions, and (4) evaluate these high priority interventions.

We conducted a study of the NCI's DBIR. The results of this study of organizational capacity of state health departments to do cancer prevention and control planning were recently reported in Health Education Research (Goodman et al., 1997; Steckler et al., 1997) In conducting our evaluation of the DBIR program we were faced with many of the organizational level data collection and analysis issues discussed above. What follows are some of the lessons we learned as a result of our research.

As part of our evaluation we conducted a survey of all 22 state health departments in the NCI study. Our sampling strategy was to include three to four people from each state health department. Prior to mailing the survey we identified (via telephone calls) in each state the DBIR principal investigator, the program manager and one or two key staff. We then mailed a survey to each of these individuals. A total of 75 surveys was mailed and 62 completed surveys were returned (82.7%). All 22 states were represented in the returned surveys.

The survey contained 250 questions that were organized into categories that corresponded to the four phases of DBIR activity. In order to examine the similarities and differences among the responses from the three organizational levels we selected 22 survey questions for intensive analysis. The questions selected were key questions that represented each of the phases of DBIR activity and for which we had responses at each of the three organizational levels surveyed.

Cohen's $\kappa$ is a measure of inter-rater agreement; values of $\kappa$ greater than 0.75 indicate strong agreement beyond chance; between 0.40 and 0.74 means fair to good; and below 0.40, poor agreement.
(Wilkinson et al., 1992). For each state we calculated three $\kappa$ values: one for agreement between principal investigator and program manager, one for agreement between principal investigator and staff, and one for agreement between program manager and staff. The responses of these individuals to the 22 key questions were used in this calculation. On the average, we found very low $\kappa$ scores (range: -0.29 to 0.70; mean = 0.26) indicating lack of agreement among respondents in the same organization.

Conclusions

The survey respondents had all worked on DBIR for a relatively long-time (more than 70% of all respondents had worked on DBIR for more than 3 years). This length of association with the program under study would be expected to increase both validity and reliability of responses across respondent categories. We suggest, therefore, that researchers studying organizational level variables ask respondents how long they have been associated with a given organization, sub-unit or program that is being studied. Data from respondents who have been associated with an organization for only a short time should be interpreted cautiously.

In conducting the DBIR survey we found that one way to 'control' for different organizational sizes when surveying multiple organizations was to sample an equal number of respondents from each organization. Conceptualizing organizations along the lines depicted in Figure 1 is useful for designing an organizational sampling plan. Sampling one or two respondents from each organizational level may give a more thorough understanding of an organization and the program or issue being studied.

When we applied Cohen’s $\kappa$, perspectives differed within organizations. This finding suggests that when multiple organizational levels are sampled, Cohen’s $\kappa$ should be applied, and where agreement is poor across organizational levels, the data should be either analyzed separately by level or aggregated very cautiously across levels. We realize that this recommendation has its limitations, i.e. reporting of organizational findings becomes more complicated as does interpretation. An alternative to analyzing separately by organizational level would be to have all the individuals receiving a survey meet to discuss their responses collectively, thus producing one completed survey for the organization. While this approach may influence the independence of each individual’s responses, in some cases such collectivity may be desirable. This approach may be less of a compromise than asking one individual to represent an organization or averaging the scores of individuals in different positions within the organization.

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Editorial

