Published in final edited form as:

Eval Program Plann. 2007 February ; 30(1): 36–44.

Using Correlational Analyses to Improve Prevention Strategies based on Survey Data from Youth

Ty A. Ridenour, Ph.D.

Center for Education and Drug Abuse Research, University of Pittsburgh

Mark E. Feinberg, Ph.D.

Prevention Research Center, Pennsylvania State University

Abstract

Community coalition prevention models often select interventions based on the types of risk factors (outcome predictors) that are elevated. Variances and correlations between predictors and targeted behaviors also may vary between communities and provide information to improve the selection of interventions. Community differences in risk factor levels and correlations between predictors and problem behaviors were examined using a child self-report computer assessment (ALEXSA®; prevention.psu.edu/people/ALEXSA.htm). Three school-based subsamples of children were studied. Means, prevalences, and correlations differed significantly between samples. Discussion addresses developmental considerations and illustrates how correlations between predictors and problem behaviors might improve the selection of interventions. This study is preliminary and should be replicated with larger community samples, more indicated/selected sample, and in more communities.

Keywords

community coalitions; risk factors; evaluation; assessment; prevention

1.0 Introduction

Notable progress has been made in developing preventive interventions that are efficacious (Ferrer-Wreder et al., 2004; Tarter, 2002). However, challenges remain both in the dissemination of efficacious and effective prevention programs and in understanding how to deliver prevention programs in community settings at a population level (Harachi et al., 1999; Hecht et al., 2003; Kam et al., 2003). Consultation and community mobilization models have been developed to assist community leaders in selecting intervention(s) that best address their community's needs. The most widely used community consultation model is promoted by the Center for Substance Abuse Prevention's Western CAPT model (modelprograms.samhsa.gov/) and Communities That Care Program (CTC; Developmental Research & Programs, Inc., 2000). A critical step in this approach is gathering data from the community to determine which predictors of problem behaviors are "elevated". Prevention

Address correspondence to: Ty A. Ridenour, Ph.D., Center for Education and Drug Abuse Research, University of Pittsburgh, 3501 Terrace St., 711 Salk Hall, Pittsburgh, PA 15621. E-mail: tar27@pitt.edu. Drafts of manuscripts cited as "in review" are available from the first author. Development and testing of the ALEXSA was funded by grants from NIDA (K01-00434) and the Pennsylvania State University Children, Youth, and Families Consortium..

Publisher's Disclaimer: This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final citable form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

strategies are then developed or selected in collaboration with community leaders (community coalitions) to reduce the most prevalent risk factors and to strengthen needed protective factors.

1.1 Potentially Faulty Analysis Assumptions

Two limitations of the current approach to community needs assessment detract from the impact of prevention efforts. The first limitation of the current approach to community needs assessment involves the analytical techniques and assumptions used to summarize assessment data. Summaries of survey data provided to community leaders often are limited to prevalences or mean levels of predictors (elevated levels approach) (Hawkins et al., 2002). At least one reason for limiting the reports to community leaders to means or prevalences may be the leaders' lack of familiarity with statistics.

In focusing only on mean levels or prevalences of problem behavior predictors, several assumptions are made. If any of the assumptions are incorrect, the selected prevention strategy might target characteristics that, even if effective, provide weak impacts on problem behaviors compared to prevention strategies selected in consideration of variances and correlations between problem behaviors and predictors.

One analytical assumption of the elevated levels approach is that variances in community predictors are not relevant to the impact of a preventive intervention. The potential information that can be provided with variances is best described using an illustration. Suppose two hypothetical communities, A and B, conducted surveys as part of a community needs assessment to identify which risk factor(s) to target to prevent later substance abuse. In hypothetical community A, the mean number of aggressive behaviors exhibited in one month by older elementary school children is two with a standard deviation of 2.5. A large proportion of the children exhibited zero aggressive behaviors, most exhibited fewer than three aggressive behaviors, and a small proportion of the children exhibited three or more aggressive behaviors (the distribution of aggressive behaviors is skewed).

Suppose in hypothetical community B, the mean number of aggressive behaviors exhibited in one month also is two but the standard deviation is 0.5 aggressive behaviors. These figures would indicate that a large majority of the late elementary school children exhibited at least one aggressive behavior, very few exhibited more than three aggressive behaviors, and a large proportion exhibited about two aggressive behaviors. Because aggression has been identified as a risk factor for substance use (Rosenberg & Anthony, 2001), and the mean number of aggressive behaviors per month was two in each community, aggressive behaviors have an equal probability of being targeted in each community's prevention efforts to reduce substance use.

All other things being equal, the greater number of individuals with "elevated" levels of aggressive behaviors in community B would indicate a greater need for programs targeting aggressive behaviors in that community. Here, the issue of how to define "elevated" becomes important (and is not specified in the current model of community coalition consultation). If elevated is defined as one or more aggressive behaviors, then community B has a large proportion of children with elevated levels of aggression. If elevated is defined as three or more aggressive behaviors, then communities A and B have a similar number of children with aggression problems. If elevated is defined in terms of mean levels, then communities A and B have the same level of aggression. Regardless of how "elevated" is defined, illumination of the difference between communities A and B in terms of aggressive behaviors would be better accomplished by examination of variances and distributions in addition to means.

Unfortunately, in practical applications, the prevalence of a risk factor is rarely used in place of the mean for continuous risk factors in reports of risk and problem behavior survey results

to communities. There may be instances in which the prevalence could provide a more accurate estimate than the mean (i.e., when the distribution of a risk factor is skewed). Even though a similar number of children in communities A and B exhibited three aggressive behaviors in one month, a greater proportion of children in community B exhibited two aggressive behaviors in one month compared to community A. Hence, whether the mean or the prevalence is used to gauge high levels of risk factors, the variance and shape of the distribution of risk factors can provide valuable insight about the risks that should be targeted in preventive intervention.

A second analytical assumption made in the elevated levels approach is that correlations between predictors and substance use or other problem behaviors are equal between communities. It is possible that correlations between predictors and number of aggressive behaviors differ significantly and meaningfully between communities.

Just as importantly, associations between predictors and problem behaviors may differ between sub-populations within the same communities. These associations between predictors and problem behaviors within subgroups of a community can moderate preventive intervention outcomes. One well-known example was cited in a review of the early prevention literature conducted by the Institute of Medicine - - children who had used alcohol or tobacco prior to certain preventive interventions experienced iatrogenic effects from the interventions (Institute of Medicine, 1994).

To further illustrate how correlational data can inform prevention strategy, consider that physical aggression has been reported as more common in urban settings compared to other settings (Farrell et al., 2000) and that alcohol abuse prevalence is lower among young African Americans than among other, same-age populations (Helzer et al., 1991). If an assessment of an African-American urban community found that aggression was high but alcohol abuse was rare, programs designed to reduce alcohol use might not be included in a prevention strategy to reduce aggression based on the elevated levels approach. However, decision makers may have failed to note a correlation between alcohol use and aggressive acts that is stronger than in other communities. Indeed, it could be expected that aggressive acts were committed by individuals while under the influence of alcohol. In that case, a prevention program targeting alcohol use might be an effective component of a larger effort to lower violence. This approach would provide a greater likelihood of successfully reducing aggression rather than ignoring alcohol use altogether—as might occur using the elevated levels approach.

1.2 Potentially Faulty Assessment Assumption

The second limitation involves assessment. Surveys to estimate levels of problem behavior risks in a community typically are from high school and middle school students (Development Research & Programs, 1998). In contrast with the typical assessment sampling, 75 to 85% of the most rigorously studied prevention programs can be used with children in 6th grade or younger (modelprograms.samhsa.gov/; Western CAPT, 1999). Moreover, most community leaders prefer to implement prevention programs for elementary school-aged or younger children (Hawkins, personal communication, October 30, 2003). When conducting the initial survey of the prevalent predictors of behavior problems, risk factors that are elevated in high school or middle school students might not resemble the risk factors that are elevated in younger children.

In part to fill the need for an assessment to collect self-report data from elementary school students, the *Assessment of Liability and EXposure to Substance use and Antisocial behavior* (ALEXSA) was recently developed (prevention.psu.edu/people/ALEXSA.htm). The ALEXSA makes available to communities a broad range of risk factor subscales appropriate for younger children (Ridenour et al., in review). ALEXSA subscales have been demonstrated to have reliability, concurrent validity, predictive validity, and construct validity children

(Ridenour et al., in review). This paper illustrates using ALEXSA assessments with 9- to 12-year old children from communities that were diverse in ethnicity and urbanicity.

1.3 The Purpose of the Present Study

The present study was conducted to explore how community coalition decisions based on the elevated levels approach might differ when supplemented with correlations between risk factors and problem behaviors. Data fitting the research questions raised in this study have not been collected specifically to address these research questions. Hence, secondary data analyses were required for this exploratory study, and consequently, there were certain methodological limitations to addressing the differences between elevated levels approach vs. a correlational approach. Nevertheless, the data were useful for the exploratory nature of this study.

2.0 Methods

Data for this study were from the first wave of a test-retest study of the ALEXSA. The methodologies used are described in greater detail by Ridenour and colleagues (in review). Hence, only a brief description of the methodology is presented here.

2.1 Design & Procedures

All procedures were approved by the Pennsylvania State University Institutional Review Board prior to recruiting participants. Assessments were administered to groups of participants ranging in size from three to 20 using individual laptop computers in schools, either in classrooms or a library, after students had completed their school day. Participants were informed that they could take breaks (8.4% did) or have a snack (almost none did). Data were stored electronically after each response was made. Participants were remunerated \$15 for completing the first ALEXSA assessment.

2.2 Samples

Subsamples of participants were recruited from three elementary schools. The first school was a rural after-school program designed to assist Mexican immigrant children with academic achievement and to assist their families to function within the U.S. culture. After-school program staff recruited participants by speaking with students and their parents using a recruitment script. Of 76 eligible students, 76 participated in the study (100% recruitment rate). Remunerations helped fund the program's extra-curricular events for the students. (Administrators and counselors expressed concern that remunerations would be taken from participants at home if the children received payments directly.) The subsample was 10.5% African American, 5.3% Native American Indian, 1.8% Asian, 3.5% Caucasian, 71.9% Latino/Hispanic, and 7.0% mixed ethnicities or some other ethnic group. Participants in this subsample were a mean of 10.2 years old ($SD = 1.13$); 43.3% were boys; and 55.2% received a free school meal. Assessments were conducted in English. Reliability and validity estimates with this sample (available from the first author) demonstrated that the English ALEXSA was valid for this group (Ridenour, 2004).

The second subsample consisted of 4th- and 5th-grade students from a rural school. The 127 participants were from 303 students (41.9%) who were invited to participate by a research study staff member during students' regular classes. Participants in this subsample ranged in age from 9 to 11 years (mean = 10.3, $SD = 0.7$); 47.2% were boys; 20.5% of participants received a free meal at school; and the ethnic composition was 1.0% African Americans, 0.0% Native American Indians, 1.0% Asians, 94.3% Caucasians, 0.0% Latinos/Hispanics, and 3.8% mixed ethnicities or some other ethnic group.

The third subsample consisted of students in two urban after-school programs designed to assist students with academic achievement. Students in one program were recruited by program staff (who spoke with students and their parents using a script) until a preset number of students had agreed to participate ($n=55$; about 50% of students who were told about the study). In the second program, a study staff member recruited participants during a meeting for students and their parents (14 of 29 students participated; 48.3%). Participants in this subsample ranged in age from 9 to 12 years (mean = 10.7, SD = 1.2), 31.9% were boys, and 73.9% of participants received a free meal at school. As for ethnicity, 83.1% of this sample were African Americans, 0.0% Native American Indians, 0.0% Asians, 0.0% Caucasians, 10.2% Latinos/Hispanics, and 6.8% were from mixed or other ethnic groups.

2.3 Assessment of Liability and Exposure to Substance use and Antisocial behavior© (ALEXSA©)

The ALEXSA was developed in part to provide community coalitions with a tool to use in collecting data from elementary school-aged children. A detailed description and psychometric estimates of this illustrated audio-visual, computer-assisted self-interview (IACASI) assessment have been reported elsewhere (Ridenour et al., in review) and are available from the first author. Wording of ALEXSA items are available at www.prevention.psu.edu/people/ALEXSA.htm. To optimize children's comprehension of items, technological advances were used to (a) not require reading or writing skills, (b) maximize attention spans, (c) communicate the questions and response options in multiple sensory modalities (e.g., text, audio, pictorial), and (d) make the assessment as interesting to children as possible. Alexis and Alex are cartoon protagonists who "act out" the questions and response options. Gender-specific response options are presented so that girls receive response options acted out by Alexis and boys receive response options acted out by Alex. Table 1 presents summaries of subscales used here, including number of items, response range, and reliability estimates.

Participants were asked their age, gender, *Number of Friends*, whether they received *Free School Meals*, if they had *Ever Repeated a School Year*, and *Modal Report Card Grade*. For each scale, the number of items, response scale range, and reliability statistics are presented in Table 1. Items measuring *Tolerance of Deviance* asked how wrong it is for children to behave in certain ways, such as clowning around in class or lying to a teacher. Two *Tolerance of Deviance* items that query tobacco and alcohol use were omitted from the present analyses. Items measuring *Friends' Conduct Disorder Criteria* asked how many of the respondents' friends have engaged in certain conduct disorder criteria (e.g., breaking into someone's house or car, vandalism). Items measuring *Family Conflict* asked if family members ever exhibit certain dysfunctional behaviors during disagreements (e.g., yelling, throwing things, hitting). *Lifetime Parental Law Problems* queried whether a participant's parent has been arrested or put in jail in the last year, and if answered "no," ever in the parents' life. *Lifetime Parental Substance Problems* queried whether a respondent's parent has had problems due to alcohol or drug use in the last year, and if answered "no," ever in their life. *School Commitment* items queried (a) how upset respondents feel and (b) how hard respondents try to get the correct answer in response to doing poorly on school work. *Parental Monitoring* items queried how well respondents' parents know different aspects of the respondent's activities when the respondent is apart from the parent (e.g., how they spend their money, how many of their friends their parents know). *Number of Drugs Identified* items asked respondents to name five substances (caffeine, alcohol, tobacco, marijuana, and "hard drugs") that are presented in sets of pictures. Respondents tell an adult ALEXSA administrator their answer and the administrator types their answer to ensure correct spelling (so that the ALEXSA program can identify when additional substance use-related questions should be administered). The corresponding inhalants item is not accompanied by pictures in case a respondent is not familiar

with inhalants (to avoid educating the respondent). *Conduct Disorder Criteria* items queried whether a respondent has ever engaged in 11 behaviors that match criteria for DSM-IV conduct disorder (APA, 1994). *Initiation of Alcohol Use* queried whether a child has ever consumed alcohol. *Initiation of Tobacco Use* queried whether a child ever consumed tobacco.

2.4 Analyses

Analyses consisted of (a) tests for prevalence, mean, or covariance differences between subsamples and (b) sample-specific estimates of Pearson correlations between predictors and *Conduct Disorder Criteria*, *Early Initiation of Alcohol Use*, and *Early Initiation of Tobacco Use*. Prevalence differences were tested using χ^2 . Mean differences were tested using ANOVA. Covariance differences between the three samples were tested using AMOS 4.0 (Arbuckle & Wothke, 1999) and the likelihood-ratio χ^2 test of the fit between models in which covariances were (a) free to vary versus (b) constrained to be equal across samples (Bollen, 1989). Rather than presenting covariances, correlation coefficients that were significantly different from zero are presented for the three subsamples to simplify comparisons between samples. Statistical adjustments to p-values (e.g., Bonferroni corrections) were not used because (a) a Type II error would lead to worse consequences than a Type I error and (b) potentially important information could be lost due to overly restrictive statistical tests (Cohen, 1990, 1994; Schmidt & Hunter, 2002). Bolded values indicate results that would suggest the risk factor should be targeted in intervention for that subsample. A somewhat arbitrary correlation coefficient of 0.30 (nearly 10% of the variance in an outcome) was used as the minimal correlation size for what would be deemed an important risk using the correlational approach.

3.0 Results

As expected from the elevated levels perspective, samples differed in levels of many of the risk factors (problem behavior predictors) (Table 2). For example, the proportion who reported receiving a *Free School Meal* was 20.5% in rural sample 2, 55.2% in rural sample 1, and 73.9% in the urban sample. *Friends' Conduct Disorder* was little more than three for the rural sample 2, over twice that for rural sample 1, and nearly three-fold that for the urban sample. The three samples also differed in sizes of the associations between predictors and outcomes (Table 3). Moreover, correlations between outcomes and either the risks or protectors differed in size depending on which outcome was analyzed.

Results presented in Tables 2 and 3 also suggested different prevention strategies would occur using the elevated levels approach versus the correlations approach. In the rural sample 1, the elevated levels approach would focus on the elevated mean levels of *Modal Grades* (or academic achievement in general), *Tolerance of Deviance*, and *Parental Monitoring* (Table 2). The elevated levels approach would target these elevated risk factors to prevent problem behaviors. The correlations approach would focus on the strongest correlations between problem behaviors and potential risk factors, and thus target *Tolerance of Deviance* and *Parental Monitoring* (consistent with the elevated levels approach). However, additional risks would be targeted by the correlations approach: *Friends' Conduct Disorder Criteria*, *Number of Drugs Identified*, and perhaps *Family Conflict* (Table 3).

Similar discrepancies in which risks should be targeted in prevention occurred in the other two subsamples. In rural sample 2, the elevated levels approach identified a single risk, *School Commitment*, whereas the correlations approach indicated that *Friends' Conduct Disorder Criteria*, *Family Conflict*, *Parental Monitoring*, and perhaps *Number of Drugs Recognized* ought to be targeted by preventive efforts. In the urban sample, the elevated levels approach identified the following risk factors: *Free School Meal* (low economic resources), *Repeating a School Year* (academic achievement or perhaps school policy), *Family Conflict*, *Parent Law Problems*, and *Parent Substance Problems*. The correlations approach suggested *Repeating a*

School Year, Tolerance of Deviance, Family Conflict, Parental Monitoring, Parent Substance Problems, and Number of Drugs Identified ought to be addressed in preventive efforts. Moreover, in the urban sample, the correlations approach suggested that prevention might be more effective if greater or more focused intervention occurred for boys.

Overall, the results consistently suggested that compared to the elevated levels approach, the correlations approach identified different risks and more risks to target in prevention of problem behaviors.

4.0 Discussion

Study results demonstrated that community samples differ not only in terms of community-level means or prevalences of risk and protective factors, but also in levels of correlations between risks or protectors and problem behaviors. Collectively, these results suggest that consultations with community leaders regarding their selection of interventions should involve more sophisticated and informative statistical information drawn from community-based surveys. Indeed, within-community correlations between risks and problem behaviors suggested very different prevention strategies than would be selected based on the elevated levels approach.

4.1 Community Risk Profiles: Elevated Levels vs. Correlations

How a prevention strategy might be formulated using the elevated levels approach versus the correlational approach differed greatly within each of the samples. To illustrate, rural sample 2 had (a) higher levels of protective factors, (b) lower levels of risk factors, and (c) low levels of behavior problems compared to the other two samples. Nevertheless, 13.5% of rural sample 2 participants reported preadolescent use of alcohol. The mean *School Commitment* score was the only risk factor that was greater than the other samples (*School Commitment* was lowest in rural sample 2) and therefore might be selected as a target for preventing using the elevated levels approach. However, *School Commitment* did not correlate significantly with any of the problem behaviors (Table 3). The elevated levels approach would have led prevention leaders astray on which characteristic to target.

The strongest correlates of early initiation of alcohol in rural sample 2 were *Family Conflict*, *Number of Drugs Identified*, *Parental Law Problems*, and *Parental Substance Problems* (Table 2). If a program that educates students on the use of substances (e.g., D.A.R.E.) is used in this school, the correlation between *Number of Drugs Identified* and *Alcohol Use* suggests that one step toward risk reduction for early alcohol initiation could be discontinuation of that program. *Family Conflict* correlated with *Parental Law Problems* (0.31) and *Parental Substance Problems* (0.34). A community coalition in rural sample 2 might attempt to reduce family conflict in their community and to focus additional efforts among parents who have had problems with the law or substance use.

4.2 Chipping Away at Risk

In the urban sample, alcohol and tobacco initiation were elevated (Table 2). Using the elevated levels approach, the most likely targets of intervention would be income (*Free School Meal*), academic achievement (*Repeat School Year*), *Friends' Conduct Disorder Criteria*, and *Parent Law Problems*. Clearly, these are important problems to address in this community. However, the strongest correlates of preadolescent substance use in the urban community were *Parental Monitoring*, *Parental Substance Problems*, *Number of Friends*, and *Modal Grade* (Table 3).

The urban sample results can be used to illustrate another consideration raised by these data that is counterintuitive to the elevated levels approach. It might be easier to impact a risk factor that is not widespread in a community. Although the mean level of *Tolerance of Deviance* is

lower in the urban sample than in rural sample 1, attempts to reduce *Tolerance of Deviance* might be more successful in the urban sample because such fewer individuals in the urban sample had a high tolerance of deviance compared to those in rural sample 1. The correlation between *Tolerance of Deviance* and *Conduct Disorder* was 0.54 in the urban sample, suggesting that decreasing *Tolerance of Deviance* may reduce conduct disorder at least in certain individuals. Perhaps in some cases, communities should consider “chipping” away at risks that are not as strongly elevated or entrenched in a community but are nevertheless associated with problem behaviors.

A second illustration of chipping away at risk involves *Parental Monitoring* in the urban sample. Using the elevated levels approach, *Parental Monitoring* would not have been identified as a risk factor to address in prevention (Table 2). Other family characteristics would more likely be viewed as needing to be improved (e.g., *Family Conflict*, *Parent Law Problems*, and *Parent Substance Problems*). In contrast, correlational data (Table 3) demonstrate that low *Parental Monitoring* is associated with *Conduct Disorder* and *Used Alcohol* at least as strongly as the more elevated family risks. However, the payoff for efforts to increase *Parental Monitoring* is likely to be greater than efforts to improve the other family risk in terms of reducing *Conduct Disorder* and preadolescent use of alcohol for two reasons. First, parental monitoring is more easily ameliorated than a parent's addiction, at least in theory and based on clinical experience which also should be considered when selecting risks to target in prevention. Second, the correlations between either *Conduct Disorder* or alcohol use were greater with *Parental Monitoring* than *Parent Substance Problems*.

4.3 Additional Considerations of the Correlational Approach

Correlations between risk factors (apart from correlations between risk factors and outcomes) might be informative in developing prevention strategies. The correlations found between *Age* and *Tolerance of Deviance* (not presented in the results) were 0.29 in rural sample 1, 0.03 in rural sample 2, and -0.21 in the urban sample. The correlations in rural sample 1 and the urban sample differed significantly ($p < 0.05$). These correlations suggest that in rural sample 1, as children age their tolerance of deviancy increases; whereas in the urban sample, children become less tolerant of deviancy as they age. One consultation approach might be to advise community leaders from rural sample 1 to target tolerance of deviancy throughout the school years. Community leaders from rural sample 2 might prefer to invest relatively greater resources in targeting tolerance of deviancy at younger ages.

One caution should be considered using either the elevated levels or correlational approaches to community-based prevention. Both approaches assume that associations between risks and outcomes reflect causal relationships between the characteristics and that by altering the presumed antecedent, the outcome also will be altered. These assumptions are based on large bodies of research (Clark & Winters, 2002; Hawkins et al., 1992; Tarter & Vanyukov, 1994; Yoshikawa, 1994). Nevertheless, a great deal of clarification of the mechanisms of the associations is needed before we can be certain about how prevention efforts impact children and youth. For example, some interventions that were intended to improve youths' outcomes have been demonstrated to generate worse outcomes than if the intervention had not been implemented or have iatrogenic effects in subgroups of youths (Institute of Medicine, 1994; Poulin, et al., 2001).

A second caution of the correlations approach is that the correlations approach is limited to better use of the information that is collected regarding risks. The difficult work of intervening well is not made easier. The correlations approach also cannot overcome poor evaluation instruments. Without good measurement, the analytical technique cannot provide good information.

4.4 Limitations

The results of this study should be considered in light of the limitations. First, data were not collected in the same manner as when sampling entire communities. Although the participation rates for these samples resemble rates found for community-based surveys (Hawkins, personal communication, October 30, 2003; Greenberg & Bumbarger; personal communication, October 30, 2003), the results of the present study should be considered preliminary until replicated with larger samples and a greater number of communities. Results were from computerized surveys conducted with 9- to 12-year-old children whereas previous community coalition survey data largely have been collected with paper-and-pencil surveys and older samples. Perhaps the differences between communities observed in the present study are greater between children than adolescents (or vice versa) or perhaps the differences observed are greater using the ALEXSA than traditional surveys (or vice versa). Future studies are needed to clarify differences between age groups, assessment instruments and techniques, or other sources of differences between communities.

4.5 Lessons Learned

The community-based participatory research (CBPR) model might provide a basis for improved assessment of community risks (Chene, et al., 2005; Minkler, 2004; Minkler & Wallerstein, 2003; Mosavel, Simon, van Stadel, & Buchbinder, 2005). Specifically, inclusion of a consultation phase with community leaders regarding which characteristics ought to be surveyed (including characteristics for which new items might be needed) likely would increase community leaders' motivation to use the data for prevention efforts within their communities. Moreover, insight as to important risk characteristics about which researchers or preventionists are naïve might be revealed by community leaders. These two benefits to assessment using CBPR alone could improve the effectiveness of prevention.

Because data were collected as part of the psychometric testing of ALEXSA subscales, CBPR was not an option in the present study. However, the ALEXSA software program permits the addition of new subscales, which could be developed in collaboration with community leaders. Using the CBPR approach may underscore the importance of using quality measures in preventive intervention and provide community leaders with greater respect for the need for psychometrically sound and accurate measures.

Another source of information that could both increase preventionists' motivation to use assessment data and demonstrate the value of assessments for prevention efforts can be found in utility statistics. Utility analyses originated in industrial and organizational psychology and can demonstrate the value of assessments in terms of how outcomes can be improved as a result of selecting individuals for preventive interventions who are most likely to benefit from them (Ridenour, Treloar & Dean, 2003; Ridenour, Treloar, Dean, Henriksen & Biner, 1999). Likewise, utility analyses can estimate how overall outcomes could be improved by identifying and excluding from intervention those individuals who might experience iatrogenic effects from the intervention. Specifying inclusion and exclusion criteria for preventive interventions would not only advance the science of prevention in terms of evaluation and outcomes, the individual candidates to receive the intervention would benefit.

In sum, the results for this illustrative study suggest that consultation with community leaders might improve prevention efforts if richer information is garnered and utilized from risk factor survey data. Prevention strategies based only on levels of risk factors within these subsamples would differ greatly from prevention strategies based on within-sample correlations between problem behaviors and risk factors. One challenge for consultants will be to communicate the more sophisticated results to laypersons in a non-technical, informative manner. These preliminary data suggest that the potential payoff for such efforts could be large.

References

- American Psychiatric Association. Diagnostic and Statistical Manual of Mental Disorders. 4th ed.. American Psychiatric Association; Washington, D.C.: 1994. DSM-IV
- Arbuckle, J.L.; Wothke, W. AMOS 4.0 User's Guide. SmallWaters Corporation; Chicago: 1999.
- Bollen, K.A. Structural equations with latent variables. Wiley; New York: 1989.
- Chene R, Garcia L, Goldstrom M, Pino M, Roach DP, Thunderchief W, Waitzkin H. Mental health research in primary care: Mandates from a community advisory board. *Annals of Family Medicine* 2005;3:70–72. [PubMed: 15671194]
- Clark DB, Winters KC. Measuring risks and outcomes in substance use disorders prevention research. *Journal of Consulting and Clinical Psychology* 2002;70:1207–1223. [PubMed: 12472298]
- Cohen J. Things I have learned (so far). *American Psychologist* 1990;45:1304–1312.
- Cohen J. The earth is round ($p < .05$). *American Psychologist* 1994;49:997–1003.
- Farrell AD, Kung EM, White KS, Valois RF. The structure of self-reported aggression, drug use, and delinquent behaviors during early adolescence. *Journal of Clinical Child Psychology* 2000;29:282–292. [PubMed: 10802836]
- Ferrer-Wreder, L.; Stattin, H.; Lorente, CC.; Tubman, J.; Adamson, L. Prevention and youth development programs: Across borders. Kluwer Academic/Plenum; New York: 2004.
- Hawkins JD, Catalano RF, Arthur MW. Promoting science-based prevention in communities. *Addictive Behaviors* 2002;27:951–976. [PubMed: 12369478]
- Hawkins JD, Catalano RF, Miller JY. Risk and protective factors for alcohol and other drug problems in adolescence and early adulthood: Implications for substance abuse prevention. *Psychological Bulletin* 1992;112:64–105. [PubMed: 1529040]
- Hays, W.L. Statistics. 4th ed.. Harcourt Brace; Orlando, FL: 1991.
- Hecht ML, Marsiglia FF, Elek E, Wagstaff DA, Kulis S, Dustman P, Miller-Day M. Culturally grounded substance use prevention: An evaluation of the keepin' it R.E.A.L. curriculum. *Prevention Science* 2003;4:233–248. [PubMed: 14598996]
- Helzer, J.E.; Burnam, A.; McEvoy, L.T. Alcohol abuse and dependence. In: Robins, L.N.; Regier, D.A., editors. *Psychiatric disorders in America: The epidemiological catchment area study*. Free Press; New York: 1991.
- Institute of Medicine. New directions in definitions. In: Mrazek, P.J.; Haggerty, R.J., editors. *Reducing Risks for Mental Disorders: Frontiers for Prevention Intervention Research*. National Academy Press; Washington, DC: 1994.
- Minkler M. Ethical challenges for the “outside” researcher in community-based participatory research. *Health Education & Behavior* 2004;31:684–697. [PubMed: 15539542]
- Minkler, M.; Wallerstein, N., editors. *Community-based participatory research for health*. Jossey-Bass; San Francisco, CA: 2003.
- Mosavel M, Simon C, van Stade D, Buchbinder M. Community-based participatory research (CBPR) in South Africa: Engaging in multiple constituents to shape the research question. *Social Science and Medicine* 2005;61:2577–2587. [PubMed: 15955605]
- Poulin F, Dishion TJ, Burraston B. 3-year iatrogenic effects associated with aggregating high-risk adolescents in cognitive-behavioral preventive interventions. *Applied Developmental Science* 2001;5:214–224.
- Kam C, Greenberg MT, Walls CT. Examining the role of implementing quality in school-based prevention using the PATHS curriculum. *Prevention Science* 2003;4:55–63. [PubMed: 12611419]
- Ridenour, T.A. Reliability and validity of the Assessment of Liability and EXposure to Substance use and Antisocial behavior (ALEXSA); Poster presented at the Annual Meeting of the College on Problems of Drug Dependence; San Juan, Puerto Rico. June 2004; 2004.
- Ridenour, T.A.; Clark, D.B.; Greenberg, M.T.; Minnes, S.; Singer, L.T.; Tarter, R.E.; Cottler, L.B. Reliability and validity of the Assessment of Liability and EXposure to Substance use and Antisocial behavior© (ALEXSA). (in review)
- Ridenour TA, Treloar JH, Dean RS. Utility analysis for clinical decision-making in small treatment settings. *International Journal of Neuroscience* 2003;113:417–430. [PubMed: 12803143]

- Ridenour TA, Treloar JH, Dean RS, Henriksen LW, Biner PM. Attribute-treatment interaction research using non-experimental data and the allocation average. *International Journal of Neuroscience* 1999;99:19–47. [PubMed: 10495194]
- Ridenour, TA.; Zinn, LF.; Mulfing-Miller, A. Early initiation of tobacco or alcohol use, impulsivity, inattention, and the perception that substance use is safe in children experiencing chronic stress. (in review)
- Rosenberg MF, Anthony JC. Aggressive behavior and opportunity to purchase drugs. *Drug and Alcohol Dependence* 2001;63:245–252. [PubMed: 11418228]
- Schmidt FL, Hunter J. Are there benefits from NHST? *American Psychologist* 2002;57:65–66. [PubMed: 11885304]
- Tarter RE. Preventing substance abuse by reduction of risk factors during childhood-Results from the CSAP predictor variables initiative [Special issue]. *Psychology of Addictive Behaviors* 2002;16(4S)
- Tarter RE, Vanyukov M. Alcoholism: A developmental disorder. *Journal of Consulting and Clinical Psychology* 1994;62:1096–1107. [PubMed: 7860808]
- WestCAPT. Best practices and promising practices: Guide to building a successful prevention program. Western CAPT; 1999. (www.unr.edu/westcapt/bestpractices/index.htm).
- Yoshikawa H. Prevention as cumulative protection: Effects of early family support and education on chronic delinquency and its risks. *Psychological Bulletin* 1994;115:28–54. [PubMed: 8310099]

Table 1

Summary of ALEXSA Subscales Used

	Number of Items	Range of Possible Scores	Cronbach's Alpha [†]	Test-retest Reliability ^{**}
Number of Friends	1	0 - 6	NA	0.45
Receives Free School Meal [*]	1	0 / 1	NA	0.81 ^κ
Repeated School Year [*]	1	0 / 1	NA	0.72 ^κ
Modal Grade	1	0 - 5	NA	0.76
Tolerance of Deviance	5	0 - 15	0.88	0.77
Friends' Conduct Disorder Criteria	8	0 - 40	0.88	0.84
Family Conflict	10	0 - 10	0.85	0.77
Lifetime Parental Law Problems [*]	2	0 / 1	NA	0.78 ^κ
Lifetime Parent Substance Problems [*]	2	0 / 1	NA	0.53 ^κ
School Commitment	2	0 - 6	0.57	0.83
Parental Monitoring	6	0 - 18	0.74	0.71
Number of Drugs Identified	6	0 - 6	0.62	0.57
Conduct Disorder Criteria	12	0 - 19	0.82	0.65
Initiation of Alcohol Use [*]	1	0 / 1	NA	0.82 ^κ
Initiation of Tobacco Use [*]	1	0 / 1	NA	0.58 ^κ

^{*} Note: 1 = yes, 0 = no. NA = not applicable.

^{**} Ridenour et al., in review; reliability estimates are intraclass correlation coefficients unless otherwise indicated.

[†] Cronbach's alphas were computed from data used in the present study.

^κ = kappa coefficient.

Table 2
Differences between Subsamples on Means or Proportions of Risk Factors

Risks and Protectors	Rural Sample 1	Rural Sample 2	Urban Sample
Gender	43.3%	47.2%	31.9%
Age	10.16 ^A	10.31 ^B	10.70 ^{A,B}
Number of Friends	5.40	5.57	5.34
Receives Free School Meal	55.2%	20.5%	73.9%
School Year	4.46 ^A	4.53 ^B	4.99 ^{A,B}
Repeat School Year	13.4%	7.1% ^A	17.4% ^A
Modal Grade	2.86 ^A	4.56 ^A	3.70 ^A
School Commitment	na	2.64 ^A	2.80 ^A
Tolerance of Deviance	3.73 ^{A,B}	1.86 ^A	1.72 ^B
Friends' CD Criteria	7.03 ^A	3.18 ^{A,B}	8.65 ^B
Family Conflict	2.12 ^A	2.64 ^B	4.01 ^{A,B}
Parent Law Problems	7.5% ^A	8.7% ^B	42.0% ^{A,B}
Parent Substance Problems	7.5%	7.9%	15.9%
Parental Monitoring	12.05 ^{A,B}	14.97 ^A	13.74 ^B
Number of Drugs Identified	2.08 ^A	1.92 ^{A,B}	2.88 ^B
Conduct Disorder Criteria	2.00 ^A	0.80 ^A	1.56
Used Alcohol	11.9%	13.5%	18.8%
Used Tobacco	7.9%	1.6% ^A	14.5% ^A

Note: Cell entries are means or prevalences. Means or prevalences with the same superscript were statistically different ($p < 0.05$). Bold values indicate results that could be considered "elevated" by community coalitions. na = not applicable.

Table 3
Differences between Subsamples on Correlations between Outcomes and Predictors

Risks and Protectors	Conduct Disorder			Used Alcohol			Used Tobacco		
	Rural 1	Rural 2	Urban	Rural 1	Rural 2	Urban	Rural 1	Rural 2	Urban
Gender	0.12	0.19	0.25	0.20	0.17	0.32	-	-	-
Age	0.06	0.20	-	-	-	-	-0.15*	0.17*	0.14*
Number of Friends	0.12	0.19	0.25	0.20	0.17	0.32	-	-	-
Receives Free School Meal	-	-	-	-0.12	0.06	-0.19	-	-	-
School Year	0.30	-0.06	-	-	-	-	0.21*	-	0.18*
Repeat School Year	0.09	-	0.31	-	-	-	-	-	-
Modal Grade	-	-	-	-	-	-	-	-0.06*	0.21*
School Commitment	-	-	-	-	-	-	-	-	-
Tolerance of Deviance	0.42*	0.15*	0.54*	-	-	-	0.31*	0.12*	0.19*
Friends' CD Criteria	0.83*	0.67*	0.23*	0.20	0.18	0.14	0.37*	0.39*	-
Family Conflict	0.23*	0.37*	0.40*	0.28	0.31	0.14	-	-	-
Parent Law Problems	0.32	0.24	0.23	-0.09	0.21	0.22	-	-	-
Parent Substance Problems	0.11	0.24	0.13	-0.11	0.22	0.41	-	-	-
Parental Monitoring	-0.41	-0.32	-0.30	-0.27	-0.18	-0.46	-0.31	-0.17	0.22
Number of Drugs Identified	0.19	0.18	-0.19	0.25	0.27	0.30	0.31	0.21	-0.20
									0.26

Note: Cell entries are correlations between the row risk factor and column outcome for the subgroup indicated in the column subheading. Correlations with the same superscript had corresponding covariances that were statistically different. Bold values indicate results that could guide community coalitions to consider the risk factor important to target in preventive intervention, based on the correlational approach. - = not statistically significant.

* significantly different covariances were found between the three subsamples ($p < 0.05$). CD = conduct disorder.