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Longitudinal Retention of Families in the Assessment of a Prevention Program Targeting Adolescent Alcohol and Tobacco Use

The Utility of an Ecological Systems Framework

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This study examined the association between ecological context (extrafamilial, familial, child factors) at baseline and longitudinal retention of families in the 36-month assessment of an adolescent alcohol and tobacco use prevention program that was conducted within a pediatric primary care setting. A total of 1,780 families were enrolled at baseline when the youth were in the fifth and sixth grades, and 1,220 of these families participated in the 36-month assessment. Findings indicated that familial and child, but not extrafamilial, factors were associated with the participation of families in the 36-month assessment. Clinical implications and future research directions are discussed.

Keywords: *alcohol use; families; prevention; primary care; tobacco use; youth*

National survey statistics suggest that alcohol and tobacco use among American adolescents remains a primary public health concern. Alcohol use is particularly widespread among youth, with 41% of adolescents having consumed alcohol by the eighth grade, and 20% of these youth reporting drinking to intoxication (Johnston, O'Malley, Bachman, & Schulenberg, 2006). Despite recent downward trends, rates of adolescent tobacco use continue to be alarming with more than one fourth (26%) of youth reporting that they have tried cigarettes by the eighth grade and 9% of youth reporting that have become regular smokers by this age (Johnston et al., 2006). In response to these statistics, significant efforts have been made by the media and the health care community to decrease the rates of alcohol and cigarette use among youth. Still, a growing body of literature has begun to focus on a critical limitation of substance use and other types of prevention efforts targeting youth, namely difficulties engaging families in the initial prevention program procedures and retaining families in the intervention and longitudinal assessments (for reviews, see Diamond & Josephson, 2005; Prinz et al., 2001; Spoth, 1999).

Although engaging families in mental health services is itself a challenge for researchers and clinicians alike, successful engagement of families does not guarantee retention. Research on the predictors of retention has typically focused on the continued participation of family in prevention or intervention services (e.g., attending a predefined number of sessions); however, other markers of continued participation include the longitudinal retention of families in the assessment of services that are offered (e.g., Morrissey-Kane & Prinz, 1999). Although various statistical approaches now provide the opportunity to include families who fail to complete one or more assessments in our analyses of treatment outcome (e.g., intention-to-treat analysis), the availability of such approaches should not minimize efforts to maximize the retention of families in our prevention and intervention work. Accordingly, research on the predictors of the longitudinal retention of families in the assessment of such programs is critical.

The majority of studies examining predictors of retention have focused on adults, with far fewer studies focusing on children and families

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(Wierzbicki & Pekarik, 1993). Moreover, the predominance of the work on the retention of children and families has focused on clinical samples (e.g., Kazdin, Holland, & Crowley, 1997; Kendall & Sugarman, 1997; Pina, Silverman, Weems, Kurtipes, & Goldman, 2003) and retention in the intervention program itself with relatively less attention in the literature to prevention programs (e.g., Biglan et al., 1991; Guyll, Spoth, Chao, Wickrama, & Russel, 2004; Orlando, Tucker, Ellickson, & Klein, 2004). To date, a range of socioeconomic, psychosocial, and practical factors has been identified as predictors of retention in prevention and intervention programs, including higher socioeconomic status (SES), married parents, and prior experience with mental health services (e.g., Biglan, Severson, Ary, & Faller, 1987; Kazdin et al., 1997; Spoth, Redmond, Kahn, & Shin, 1997). Notably, prior work on predictors of retention in family-based prevention and intervention programs has been largely atheoretical, with analyses often limited to variables available to the researcher on an intake or sociodemographic form (e.g., ethnicity, SES), rather than guided by a theoretical model (Kazdin et al., 1997). Such an approach offers little explanation for why certain variables are better predictors of retention than others and provides little information about their collective influence on retention (e.g., Gorman-Smith et al., 2002). Moreover, the predominance of this work has focused on short-term retention in the intervention program itself (e.g., attendance at three of five sessions), rather than longitudinal retention of families in the assessment procedures. Accordingly, the current study aimed to advance this research by utilizing a well-established theoretical framework to guide the selection of potential predictors of longitudinal retention of families in the assessment of a family-focused alcohol and tobacco use prevention program and to guide hypotheses regarding relative significance of various predictors in the theoretical model.

The social-ecological model (Bronfenbrenner, 1979; Cicchetti & Lynch, 1993) posits that youth must be understood and studied within the multiple contexts in which they grow and develop. According to this framework, the contexts most distal to the child, the macrosystem and the exosystem, are characterized by extrafamilial factors, or factors outside the family. The macrosystem encompasses societal beliefs and values that influence the child (e.g., racism, culture), whereas the exosystem includes community characteristics (e.g., neighborhood risks and resources). The microsystem is characterized by immediate environments that influence child functioning (e.g., family factors such as parenting) and, finally, the ontogenic or individual-level system includes characteristics of the child, such as gender and age. Ecological-systems theory has been used as a framework to study

multiple domains of child and family adjustment (e.g., Jones, Forehand, Brody, & Armistead, 2003) and has also guided the development of prevention and intervention work (e.g., Dishion & Kavanaugh, 2002; Snell-Johns, Mendez, & Smith, 2004).

Consistent with the ecological-systems theory, longitudinal retention of families in the assessment of the current alcohol and tobacco use prevention program was examined as a function of the multiple contexts or levels in which participating children lived and interacted, ranging from those most distal to the child to those that were increasingly proximal. Thus, three broad categories of variables (extrafamilial, familial, and child) were examined, with each variable further classified as either structural (i.e., less amenable to behavioral intervention) or psychological (i.e., likely amendable by behavioral intervention). As each of the levels in ecological systems theory is rather broad, a wide range of variables could represent each broader category. The variables we chose to examine at each level were consistent with the theory but also have been linked with child and family adjustment.

Four extrafamilial variables were examined, including two structural variables (neighborhood crime and deterioration) and two psychological variables (peer alcohol use and cigarette smoking). Whether using census tract data or family perceptions of neighborhood quality, various aspects of neighborhood quality, including crime, violence, and other risks, have been associated with a wide range of difficulties for youth (e.g., Garbarino, 2000; Jones, Foster, Forehand, & O'Connell, 2005; Margolin & Gordis, 2000; Zalot, Jones, Forehand, & Brody, 2007). Furthermore, the peer group serves as a powerful model for child behavior, and youth are more likely to use substances when their peers do as well (for a review, see Kobus, 2003).

A total of seven familial variables was examined. Of these, four were structural (family income, marital status, ethnicity, and parental education) and three were psychological (parental problems with alcohol, parental smoking, and positive parenting). Family sociodemographic variables have been consistently associated with psychosocial adjustment difficulties. For example, children from single-parent, minority, low-income families are more likely to display higher rates of internalizing problems, externalizing problems, and alcohol and tobacco use, with some evidence to suggest poorer retention in prevention and intervention programs (e.g., Johnston et al., 2006; Kazdin et al., 1997; Kazdin, Mazurick, & Bass, 1993; Kazdin, Mazurick, & Siegel, 1994). Furthermore, parents are salient models for child behavior, in general, with parental use of alcohol and cigarettes highly correlated with child use (e.g., Fleming, Kim, Harachi, & Catalano, 2002), and

parental problems with alcohol associated with a range of child adjustment problems (e.g., Coffelt et al., 2006). In addition, positive parenting, or parenting behaviors characterized by a balance of warmth, control, and clear expectations, has consistently been protective of adolescent health and well-being (see Basic Behavioral Science Task Force, 1996, for a review).

With regard to child-level variables, we examined two structural (child age and child gender) and six psychological (child internalizing and externalizing problems, child alcohol and tobacco use, and child academic and social competence) variables. As children age, they become less likely to participate and complete prevention and intervention programs (Kazdin et al., 1993; Kazdin et al., 1994), and some evidence also suggests that boys are less likely to be retained than girls (e.g., McMahon & Wells, 1998). Furthermore, lower levels of psychosocial adjustment difficulties, including externalizing behaviors and substance use at baseline, are associated with lower levels of retention and completion of prevention and intervention programs (e.g., Biglan et al., 1987; Pina et al., 2003). Although child competence has received less empirical attention in the retention literature, it may be that the families of children who demonstrate greater academic and social competence are more likely to be retained.

Consistent with the positive psychology movement (Aspinwall & Staudinger, 2003; Seligman, 2002), the dependent variable of interest was participation of families at the 36-month assessment, rather than lack of participation. Accordingly, it was hypothesized that factors within multiple contexts or levels would predict whether families participated in the 36-month assessment. Overall, we hypothesized that because variables in the family-system level are more proximal to the child, they would be more likely to emerge as significant predictors of longitudinal retention in 36-month assessment than would those in the extrafamilial system. We further hypothesized that individual child variables would more likely be significant predictors of longitudinal retention in the 36-month assessment than would those in the extrafamilial system, as the former are most proximal to the child. Finally, as both parents and children likely influence to some degree family participation in longitudinal assessments, we expected variables in the family and individual systems to predict retention and do not offer specific hypotheses regarding the relative contribution of variables in each. Furthermore, as structural and psychological-level variables have independently predicted retention in previous research (e.g., Gorman-Smith et al., 2002), we do not offer a hypothesis about the differential predictive value of these categories of variables.

Method

Overview

The Dartmouth Prevention Project (DPP; Stevens et al., 2002) was a National Institute on Alcohol Abuse and Alcohol (NIAAA)-funded randomized control trial aimed at preventing child and adolescent alcohol and tobacco use. A cohort of fifth- and sixth-grade students and one of their parents were recruited at well-child visits in 12 pediatric primary care practices in Massachusetts, New Hampshire, and Vermont in rural and urban settings and serving a broad range of families. The pediatric practices were randomly assigned to a prevention or control condition. Participating clinicians changed the focus of well-child visits from usual care to encouraging parent-child communication about alcohol and tobacco use (prevention) or gun, seat belt, and bicycle helmet safety (control). Participating parent-child dyads were followed over 36 months, with assessments initially taking place when children were in fifth and sixth grades (baseline), and then 12, 24, and 36 months later.

Of the 4,096 families approached during the 21-month recruitment period, 3,525 (86%) agreed to participate, 3,496 (85%) met the grade eligibility requirements, and 3,145 (77%) completed baseline assessment ($n = 1,780$ prevention, $n = 1,365$ control). At the 36-month assessment, 2,183 families were retained. Although DPP did not have an impact on alcohol or tobacco use at the 36-month assessment, the prevention arm of the study was successful in preventing externalizing problems, but only among boys, as well as internalizing problems, but only for boys whose parents engaged in higher levels of positive parenting (Jones, Olson, et al., 2005).

Participants

Participants for the current analyses were the 1,780 parent-child dyads who were enrolled in the substance use prevention arm at baseline. The demographic characteristics of these participating parents and children at the time of enrollment are reported in Table 1.

Procedures

All pediatricians, nurse practitioners, and office staff at each site were trained by project staff during a 3-hour on-site session. Training included an introductory presentation about the project's components and respective rationale,

Table 1
Descriptive Statistics for Predictor Variables at
Baseline and Bivariate Associations With Participation
in 36-Month Assessment

| | <i>M (SD)</i> | <i>r</i> | <i>% (n)</i> | χ^2 |
|---------------------------------------|---------------|----------|---------------|----------|
| Extrafamilial: Structural | | | | |
| Neighborhood crime (% no) | | | 76.24 (1,357) | 2.76 |
| Neighborhood deterioration (% no) | | | 1.51 (27) | 3.44 |
| Extrafamilial: Psychological | | | | |
| Peer alcohol use (% none) | | | 95.89 (1,706) | 3.27 |
| Peer tobacco use (% none) | | | 89.91 (1,600) | 6.57** |
| Familial: Structural | | | | |
| Family income (\geq US\$50,000) | | | 56.88 (1,012) | 26.02*** |
| Ethnicity (% White) | | | 97.58 (1,736) | 4.08* |
| Marital status (% married) | | | 94.21 (1,676) | 20.99*** |
| Parent education (# years) | 14.60 (2.49) | .11** | | |
| Familial: Psychological | | | | |
| Parental problems with alcohol (% no) | | | 77.9 (1,386) | 3.76 |
| Parental tobacco use (% no) | | | 82.36 (1,466) | 46.7*** |
| Positive parenting | -.02 (2.05) | -.002 | | |
| Preadolescent: Structural | | | | |
| Age (years) | 10.96 (.87) | -.08* | | |
| Gender (% Girls) | | | 49.55 (882) | 14.77*** |
| Preadolescent: Psychological | | | | |
| Academic competence | 1.78 (.42) | .05 | | |
| Social competence | 7.80 (2.18) | -.07*** | | |
| Internalizing difficulties | 2.10 (1.84) | -.02 | | |
| Externalizing difficulties | 2.55 (1.88) | -.06** | | |
| Alcohol use (% no) | | | 92.4 (1,644) | .15 |
| Tobacco use (% no) | | | 94.3 (1,680) | 8.46** |

* $p < .05$. ** $p < .01$. *** $p < .001$

as well as information regarding the rates of the target behaviors among youth in the local area. The training session focused on how clinicians could shift the focus of well-child visits from screening to family communication about the respective target behavior (substance use or safety) and included role-plays and feedback from research staff. After the initial training, quarterly newsletters were also sent to all clinic staff with updates regarding the project, “messages of the month,” and suggestions based on the experiences of other sites.

During initial clinic visits, participating families were encouraged by participating primary care physicians (PCP) to discuss the respective target behavior, sign family contracts that stated that they would continue to discuss the target behaviors at home, and develop family policies regarding the implications for violations of the contracts. Approximately 10 days later, families received signed letters from the PCP reinforcing the family contracts, the prevention messages, and development of family policies about the target behaviors.

Families were reminded of the importance of communication about the target behaviors at each subsequent visit over the course of the next 36 months. Clinicians received pocket-sized "message of the month" cards that served as cues to deliver the prevention messages. The prevention program was further supported by three sets of materials mailed to families: brochures on communication, annual reminders with project messages, and quarterly newsletters with role-appropriate information and messages.

At each assessment, questionnaires were mailed to each participating parent-child dyad who each were instructed to complete and return their questionnaire packets independently. When the questionnaire packets were returned, the child received US\$5. If questionnaires were not returned, families received reminders (e.g., 4 weeks - reminder card, 6 weeks - reminder telephone call). Identical procedures were followed at each assessment. All procedures were approved by the IRB at Dartmouth Medical School.

Measures

All measures examined in the current study were collected from parents and children at the first assessment (baseline), with the exception of the outcome of interest, participation in the 36-month assessment.

Longitudinal retention. Longitudinal retention in the assessment of the prevention program was operationalized as whether or not the family participated in the 36-month assessment. Families who returned their questionnaires at the 36-month assessment were considered "retained," whereas those who did not were considered "not retained."

Extrafamilial variables. Extrafamilial variables were defined as characteristics of the neighborhood or community in which the child resided. Parents were asked to rate whether they had experienced "concerns about crime" or "concerns about neighborhood deterioration" in their neighborhoods during the past six months (*yes* or *no*). Parents were further asked to rate

their level of distress associated with each of these neighborhood concerns (*not very, somewhat, or very*). These two items were combined to create two structural extrafamilial variables (neighborhood crime and neighborhood deterioration), each with possible scores ranging from 0 (*not a concern*) to 3 (*a very stressful concern*).

Two psychological extrafamilial measures (peer smoking and peer alcohol use) were obtained via child report. Peer smoking was assessed by asking children, "How many of your friends smoke cigarettes fairly often?" (0 = *none*, 1 = *one or two*, 2 = *several*, 3 = *most of them*). Peer alcohol use was assessed by asking children, "How many of your friends drink fairly often?" (0 = *none*, 1 = *one or two*, 2 = *several*, 3 = *most of them*).

Familial variables. Familial variables were characteristic of the child's family environment. Four parent-reported structural familial variables were assessed: family income (1 = *below \$6,000* to 16 = *\$50,000 or more*), ethnicity of the family (*White, Black, Hispanic, Other*), parent education (number of years), and parent's marital status (*never married, currently married, separated, divorced, widowed*). Three psychological familial variables were assessed via parent report: parental tobacco use, parental problems with alcohol use, and positive parenting. Parental tobacco use was assessed with one item, "How frequently have you smoked cigarettes in the past 30 days?" (1 = *not at all* to 7 = *two packs or more a day*). Parental problems with alcohol was assessed with a single item as well, "How often have you been drunk in the past 30 days?" (1 = *never* to 3 = *more than once*).

The positive parenting measure consisted of three sets of items designed to assess warmth, appropriate discipline, and clear expectations for child behavior. All items were completed by the child for the mother and the father. Parental warmth and appropriate discipline were each assessed using Barnes and Farrell's (1992) parenting measure. This measure has demonstrated adequate reliability, with alpha coefficients of .80 for child report of maternal warmth and .84 for child report of paternal warmth (Barnes & Farrell). Reported alpha coefficients for child reports of maternal and paternal discipline are .73 and .85, respectively (Barnes & Farrell).

Five items from the Barnes and Farrell (1992) parenting measure assessed parental warmth. Children indicated on a 5-point Likert-type scale (ranging from *always* to *never*) the frequency with which each parent engages in five supportive responses (e.g., "How much do you rely on your mother (father) for advice or guidance?"). Possible scores ranged from 5 to 25, with lower scores indicating more warmth. The alpha coefficients for the current sample were .65 for mothers and .76 for fathers.

Appropriate discipline was assessed using four items from the Barnes and Farrell (1992) measure. Children used a 5-point Likert-type scale (ranging from *always* to *never*) to indicate the frequency with which each parent engaged in four discipline strategies after the child has disobeyed or done something that the parent does not approve of (e.g., “warns you not to do the same thing again,” “takes away your privileges”). Possible scores ranged from 4 to 20, with lower scores indicating more positive disciplinary strategies. Alpha coefficients for the current sample were .70 for mothers and .78 for fathers.

Children also were asked a single question related to clear parental expectations for their behavior, “In general, do you know what your mother (father) expects of you?” This item was completed on a 5-point Likert-type scale ranging from *always* to *never*, with lower scores indicating clearer expectations.

To form a positive parenting construct, each of the three dimensions (warmth, appropriate discipline, clear expectations) was standardized for each parent and summed across dimensions and parents. Lower scores indicate more positive parenting.

Child variables. Several individual-level variables hypothesized to influence the success of the prevention program also were examined. Two structural child variables, reported by the child, were examined: child age and child gender. In addition, six psychological child variables, including academic and social competence, alcohol and tobacco use, and internalizing and externalizing problems, were examined. Child academic competence was assessed by parent report on a single item: “Has your child had any academic problems in school?” (1 = *yes*, 2 = *no*). Child social competence was assessed by three child-reported items, “I am shy,” “Talking to kids I don’t know is hard for me,” and “Making new friends is hard for me” (1 = *never* to 4 = *often*). Responses for each item were summed to form the child social competence measure, with higher scores indicating less social competence ($\alpha = .72$).

Youth alcohol use was assessed by asking, “Have you ever had any alcoholic beverages to drink, except in church or synagogue or with your parents on a holiday like Thanksgiving?” (0 = *never*, 1 = *ever*). Cigarette use was assessed by asking, “Have you ever smoked cigarettes?” with a 5-point Likert-type scale ranging from 1 (*never*) to 5 (*regularly now*).

Child internalizing and externalizing problems were assessed by parent-report on the Pediatric Symptom Checklist-17 (PSC-17; Gardner et al., 1999), a brief version of the Pediatric Symptom Checklist (Jellinek, Evans, & Knight, 1979). The PSC-17 is a 17-item questionnaire with two subscales

designed to measure internalizing and externalizing symptoms. Five items constitute the internalizing subscale (e.g., “child feels sad, unhappy,” “child feels hopeless”), whereas five items assess externalizing problems (e.g., “child fights,” “child does not listen to rules”). Parents rate each item on a 3-point Likert-type scale (*often, sometimes, or never*), with higher scores indicating higher levels of symptoms. The PSC-17 has demonstrated sound internal consistency and validity (Gardner et al., 1999), including good concordance with the Child Behavior Checklist (Achenbach, 1991; Jellinek, Murphy, & Burns, 1986). Alpha coefficients for the current sample were .76 for the internalizing subscale and .80 for the externalizing subscale.

Results

Preliminary Analyses

Preliminary analyses revealed that several of the major study variables were highly skewed. Therefore, the following independent variables were dichotomized for the purposes of the current study: Neighborhood crime (0 = *no*, 1 = *yes*), neighborhood deterioration (0 = *no*, 1 = *yes*), peer alcohol use (0 = *no*, 1 = *yes*), peer cigarette smoking (0 = *none*, 1 = *1 or more*), family income (0 = $< \$50,000$, 1 = $\geq \$50,000$), ethnicity (0 = *Caucasian*, 1 = *Other*), parent’s marital status (0 = *not married*, 1 = *married*), parent problems with alcohol (0 = *never*, 1 = *ever*), parental tobacco use (0 = *never*, 1 = *ever*), and youth alcohol (0 = *never*, 1 = *ever*) and cigarette use (0 = *never*, 1 = *ever*).

Descriptive statistics for the major study variables, and bivariate associations with retention at the 36-month assessment, are presented in Table 1. Of the 1,780 families enrolled in the prevention arm, 1,220 families (68.5%) participated in the 36-month assessment and were considered retained participants. No significant bivariate associations were obtained between the extrafamilial structural variables and retention; however, a significant association was obtained between one of the extrafamilial psychological variables, peer tobacco use, and retention ($\chi^2 = 6.57, p < .01$). Families were less likely to participate in the 36-month assessment if the youth enrolled in the study affiliated with peers who had smoked cigarettes. The following familial structural variables also were significantly associated with retention at the bivariate level: family income ($\chi^2 = 26.02, p < .001$), ethnicity ($\chi^2 = 4.08, p < .05$), marital status ($\chi^2 = 20.99, p < .001$), and parent education ($r = .11, p < .01$). Families who earned greater or equal to \$50,000 annually, were White, were intact, and who had a greater level of education were more likely to participate in the 36-month assessment. Retention

also was associated with one familial psychological variable, parental tobacco use ($\chi^2 = 46.7, p < .001$), such that families in which parents did not report smoking were more likely to be retained. Finally, retention was associated with one child structural variable and three child psychological variables at the bivariate level: Child gender ($\chi^2 = 14.77, p < .001$), social competence ($r = -.07, p < .001$), externalizing problems ($r = -.06, p < .01$), and youth tobacco use ($\chi^2 = 8.46, p < .001$). Families for whom the participating youth was female had lower social competence, had fewer externalizing difficulties, and who had ever tried smoking were more likely to participate in the 36-month assessment.

Primary Analyses

Consistent with prior calls to examine the collective influence of multiple predictors on retention (e.g., Gorman-Smith et al., 2002), the primary hypotheses were examined using logistic regression analysis to predict participation of families at the 36-month assessment. Predictor variables were entered in blocks with variables most distal to the child being entered first (extrafamilial factors) and those most proximal to the child entered last (child factors). This analytic plan allowed us to examine variables that typically have less influence on child and adolescent behavior (distal variables) before examining those that typically have more influence on child and adolescent behavior (proximal variables). Extrafamilial factors at baseline were entered in Blocks 1 (structural) and 2 (psychological), familial factors at baseline were entered in Blocks 3 (structural) and 4 (psychological), and child factors at baseline were entered in Blocks 5 (structural) and 6 (psychological). The outcome variable of interest was whether or not the family participated in the final 36-month assessment (0 = *not retained*, 1 = *retained*).

As demonstrated in Table 2, fewer contextual variables remained significant predictors of retention in the multivariate model. In contrast to the bivariate analyses in which peer tobacco use was associated with retention, none of the extrafamilial structural or psychological variables was associated with the family's participation in the 36-month assessment. Among the familial structural variables, two variables were associated with retention: parental marital status ($\beta = .36, p < .05$, odds ratio [OR] = 1.44, Confidence interval [CI] = 1.04 – 2.00) and education ($\beta = .06, p < .01$, OR = 1.06, CI = 1.02 – 1.11). Families were more likely to participate in the 36-month assessment if the parents were married and had higher levels of education. Only one familial psychological variable was associated with retention: Parental smoking ($\beta = -.16, p < .001$; OR = .85, CI = .79 – .92). Families

Table 2
Summary of Logistic Regression Analysis Predicting Family Participation in the 36-Month Assessment

| Variable | β | Odds Ratio | 95% Confidence Interval | Model χ^2 | -2 Log Likelihood |
|--------------------------------------|---------|------------|-------------------------|----------------|-------------------|
| Block 1: Extrafamilial structural | | | | 2.51 | 2110.22 |
| Neighborhood deterioration | -.12 | .89 | .73 – 1.08 | | |
| Neighborhood crime | -.05 | .95 | .84 – 1.08 | | |
| Block 2: Extrafamilial psychological | | | | 8.97 | 2103.76 |
| Peer cigarette use | -.34 | .71 | .48 – 1.04 | | |
| Peer alcohol use | -.19 | .82 | .47 – 1.45 | | |
| Block 3: Familial structural | | | | 45.95*** | 2044.94 |
| Family income | .04 | 1.04 | 1.00 – 1.08 | | |
| Marital status | .36* | 1.44 | 1.04 – 2.00 | | |
| Ethnicity | -.61 | .54 | .28 – 1.03 | | |
| Parental education | .06** | 1.06 | 1.02 – 1.11 | | |
| Block 4: Familial psychological | | | | 63.15*** | 2024.23 |
| Parent cigarette use | -.16*** | .85 | .79 – .92 | | |
| Parent problems with alcohol | -.18 | .83 | .67 – 1.04 | | |
| Positive parenting | .02 | 1.02 | .96 – 1.07 | | |
| Block 5: Child structural | | | | 84.56*** | 1965.59 |
| Age | -.21** | .81 | .72 – .93 | | |
| Gender | .34** | 1.41 | 1.13 – 1.75 | | |
| Block 6: Child structural | | | | 87.82*** | 1907.68 |
| Academic competence | .07 | 1.07 | .81 – 1.41 | | |
| Social competence | -.06* | .95 | .90 – 1.00 | | |
| Internalizing problems | .02 | 1.02 | .95 – 1.10 | | |
| Externalizing problems | -.04 | .96 | .90 – 1.03 | | |
| Alcohol use | -.12 | .90 | .58 – 1.39 | | |
| Cigarette use | .40 | 1.50 | .91 – 2.45 | | |

* $p < .05$. ** $p < .01$. *** $p < .001$

were more likely to participate in the 36-month assessment if the parents were nonsmokers. Two of the child structural variables were associated with retention: child age ($\beta = -.21$, $p < .01$, OR = .81, CI = .72 – .93) and gender ($\beta = .34$, $p < .01$, OR = 1.41, CI = 1.13 – 1.75). Families were more

likely to participate in the 36-month assessment if the participating youth was younger and female. Finally, one child psychological variable was associated with retention: social competence ($\beta = -.05$, $p < .05$, OR = .95, CI = .90 – 1.00). Families whose participating youth were more socially competent were more likely to participate in the 36-month assessment; however, an OR of 1.00 was included in the CI suggesting that the findings should be interpreted with caution.

Discussion

In an attempt to address a call in the literature for an examination of the predictors of retention in family-based prevention and intervention programs (e.g., Diamond & Josephson, 2005; Prinz et al., 2001), the current study examined theoretically derived and empirically guided predictors of longitudinal retention of families in the assessment of pediatric primary care-based prevention program targeting adolescent alcohol and tobacco use. Guided by ecological-systems theory (Bronfenbrenner, 1979; Cicchetti & Lynch, 1993), which posits that children must be studied and understood within the multiple contexts in which they live and interact, we examined multiple predictors of longitudinal retention in the assessment of the program, including extrafamilial, familial, and child variables. Our hypothesis that variables at each contextual level would predict retention was partially supported. Although variables from a broader range of contexts were associated with retention in the bivariate analyses, the focus of the current study was on the collective influence of multiple variables in a theoretically driven model. Therefore, the discussion focuses on the results of the multivariate analyses in which variables were entered according to context, and contexts were entered in accordance to their proximity to the child.

Multivariate analyses revealed that familial and child factors, but not extrafamilial factors, predicted the participation of families in the 36-month assessment. Families in which the parents were married (familial structural), had higher levels of education (familial structural), and were non-smokers (familial psychological) were more likely to participate in the 36-month assessment of the alcohol and tobacco use prevention program. In addition, families whose participating youth were younger (child structural), female (child structural), and more socially competent (child psychological) were more likely to be retained. Neither extrafamilial structural (neighborhood crime and deterioration) nor extrafamilial psychological (peer alcohol and cigarette use) were associated with the family's participation in the 36-month assessment in the multivariate analyses.

The finding with regard to parents' marital status and education is consistent with Kazdin and colleagues' work (Kazdin et al., 1997; Kazdin et al., 1993; Kazdin et al., 1994) that suggests that higher SES is associated with retention in intervention programs using clinical child samples. In our sample, family income and ethnicity were not predictive of retention in the 36-month assessment, although this may be due in part to the low levels of variability within these two factors (i.e., most of the sample was White and middle to upper income). Although mental health professionals have little power to modify a family's marital status or level of education, such demographic information can be used to identify those families who may be least likely to complete longitudinal assessments, which in turn may allow us to heighten our efforts to minimize the barriers to participation in longitudinal assessments for these families, a strategy that has proved beneficial in other prevention research (e.g., Gorman-Smith et al., 2002).

Families in which the parents did not smoke were also more likely to participate in the 36-month assessment than families in which parents smoked. Parental substance use is often associated with child use (Fleming et al., 2002); and, perhaps, the nonsmoking status of parents is a marker for heightened awareness of the dangers of smoking and concerns about their children not initiating the habit. It is interesting that parental smoking, but not problem drinking, was associated with longitudinal retention in the assessment of this particular prevention program. One possibility is that smoking is a behavior that parents clearly recognize is a "bad habit" and something they would like to quit and prevent their children from initiating but is a behavior that is not likely to interfere with child or family functioning per se. In contrast, parental problem drinking is a behavior that, although parents may hope to not transmit to their youth, is more likely to interfere with child and family functioning; and, in turn, its effect may be mediated by other variables that we examined. It is important to note that parental smoking is a modifiable factor, and our findings suggest that programs that perhaps simultaneously target parental and child tobacco use may enhance retention in longitudinal assessments.

Two youth demographic variables, age and gender, also were associated with the family's participation at the 36-month assessment. There are several reasons why families with younger children may have been more likely to participate. First, adjustment difficulties, which have been associated with treatment dropout, become more prevalent as children age (e.g., Kazdin et al., 1997; Kazdin et al., 1993; Kazdin et al., 1994). Second, as children move into adolescence, they typically are allowed greater input into family decision making and, thus, may be more influential in the family's decision to complete the assessment measures or not. Accordingly,

the current findings suggest that the earlier prevention programs are implemented, the better the chance of retaining the family in the longitudinal assessment procedures. Our finding that families with girls were more likely to participate in the 36-month assessment than boys is consistent with findings from prevention and intervention programs generally (see McMahon & Wells, 1998, for a review). Accordingly, increased efforts may need to be made in future prevention work to increase participation of families with boys in longitudinal assessments, perhaps by identifying and addressing barriers to participation (e.g., time constraints, higher levels of behavior problems).

Finally, families whose youth were more socially competent, but not necessarily more academically competent or psychologically well-adjusted, were more likely to participate in the 36-month assessment. Our program was not a group-based prevention effort, so this finding cannot be accounted for by more socially competent children being more engaged in the program generally and, thus, more willing to complete the questionnaires. However, children who are more socially competent may feel more comfortable practicing and implementing the strategies conveyed throughout the prevention program; and, thus, their families may be more likely to complete the assessment when it occurs than youth who are less socially competent. Similarly, youth who are more socially competent also may experience lower levels of adjustment difficulties (e.g., internalizing and externalizing problems) that may not only be associated with less substance use but also provide one less barrier to the family's successful completion of the assessment. Finally, more socially competent youth may experience less discomfort answering the types of questions that are assessed in programs such as this one and, in turn, resist doing so to their parents than less socially competent youth. Future work should examine specific mechanisms by which social competence is associated with participation in longitudinal assessments. For now, mental health professionals are well equipped with cognitive and behavioral strategies to target and enhance children's social competence, which enhance the participation of families in longitudinal assessment procedures.

As highlighted elsewhere, the ecological-systems model has become a guiding framework for identifying pathways between neighborhood risk and child adjustment (for a review, see Salzinger, Feldman, Stockhammer, & Hood, 2002). Much of this work has revealed that neighborhood characteristics are associated with a wide range of internalizing and externalizing difficulties in children and adolescents (for reviews, see Garbarino, 2000; Margolin & Gordis, 2000). Our null findings regarding characteristics of

the neighborhood may suggest that, although predictive of child adjustment, neighborhood crime and deterioration are not significant predictors of participation in longitudinal assessments. Alternatively, the null findings may be a function of the sample; that is, studies of neighborhood influence have primarily been conducted with low income, urban, and minority families who are exposed to relatively high levels of neighborhood crime and deterioration (for reviews, see Garbarino, 2000; Margolin & Gordis, 2000). In contrast, the current sample is predominately White and middle income, suggesting that the extent of neighborhood risk is likely much less than reported in previously studies. Conclusions regarding the role of neighborhood characteristics should, therefore, be made with caution until research with more diverse samples is conducted.

Peer alcohol and cigarette use also were not significant predictors of familial participation in the 36-month assessment in the multivariate analyses. This is not entirely surprising: Although peer substance use is a robust predictor of adolescent substance use (for a review, see Kobus, 2003), it is unlikely to affect family decision making. However, as with the neighborhood variables, the absence of a significant association may be a result of the nature of our sample. This prevention program began when children were in the fifth and sixth grades, with the goal of involving children and families prior to child substance-use initiation. Therefore, by virtue of the design of the current study, the children's young peers were using alcohol and cigarettes at very low levels, potentially limiting the opportunity to find a significant association between peer use and child retention. Low levels of alcohol and cigarette use among the participating children also may explain the lack of association between their own substance use and the family's participation at the 36-month assessment.

In contrast to our prediction, positive parenting was not associated with retention in the bivariate or multivariate analyses. Although positive parenting has been associated with lower rates of substance use for youth (see Basic Behavioral Science Task Force, 1996, for a review), it may not be directly linked with the likelihood that families will participate in the assessment of an alcohol and tobacco use prevention program. It is important to note that findings from research based on the control group (gun, seat belt, and bicycle helmet safety arm) of the DPP suggest that positive parenting and parental smoking interact to predict youth smoking (Foster et al., in press). Accordingly, future research should determine whether these variables interact to predict family retention as well. For example, perhaps those parents who smoke *and* engage in greater positive parenting behavior are more likely to participate in the assessments. Finally, prior work with

the DPP suggests that positive parenting prevents internalizing and externalizing problems among youth in the prevention, but not control, group (Jones, Olson, et al., 2005). Accordingly, positive parenting may indirectly affect assessment participation by increasing youth competence and decreasing youth behavior problems.

As with all research, the findings of the current study must be interpreted in light of its limitations. First, all of the predictor variables were examined via self-report, although our use of different reporters across variables decreases the likelihood that the obtained findings are due to common method variance. Future research should include multiple methods of measurement for each of the contexts under study, including census tract data to measure the extrafamilial context, observation data to measure the familial context, and clinical interview to assess individual, child-level variables. Second, the clinics used in the current prevention program were randomly assigned within pairs to either the prevention or control conditions. Although previously reported findings suggest that the clinics did not significantly account for variability in child outcomes (Jones, Olson, et al., 2005), future work should examine retention in families who have been truly randomly assigned to prevention conditions to limit the opportunity for confounds and to maximize the generality of findings. Finally, the findings of the current study should be generalized with caution. As previously noted, the current sample of families was primarily White, predominately intact, and of middle to upper income.

Despite these limitations, several strengths of the current study merit attention. To our knowledge, this is the first study to use social-ecological theory (Bronfenbrenner, 1979; Cicchetti & Lynch, 1993) to empirically examine predictors of longitudinal retention of families in the assessment of an adolescent substance use prevention program. Social-ecological theory has long been used as a framework for conceptualizing child and adolescent adjustment; the current findings suggest it is also a useful framework for identifying predictors of family participation in the longitudinal assessment of an alcohol and tobacco use prevention program. An additional strength of the current study is its prospective design, which permitted the examination of baseline variables as predictors of participation at an assessment that occurred 36 months later. Finally, the inclusion of fathers in the current sample is important as they have, for the most part, been noticeably absent from the child and family literature, in spite of research documenting their important role in adolescent development (for reviews, see Phares, 1996, 1997; Phares, Lopez, Fields, Kamboukos, & Duhig, 2005).

In conclusion, the findings from the current study suggest that ecological-systems theory (Bronfenbrenner, 1979; Cicchetti & Lynch, 1993) provides a useful framework for identifying those families most likely to participate in the final longitudinal assessment of an alcohol and tobacco use prevention program targeting youth. Some of the predictors identified are amenable to psychological or behavioral intervention (e.g., parental smoking, child social competence), whereas others (e.g., SES indicators, child age, and gender) may serve only to assist us in identifying and further supporting those families least likely to participate in the assessments of our treatment outcome research.

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