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Telephone Counseling to Implement Best Parenting Practices to Prevent Adolescent Problem Behaviors

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Abstract

There is considerable suggestive evidence that parents can protect their adolescents from developing problem behaviors if they implement recommended best parenting practices. These include providing appropriate limits on adolescent free time, maintaining a close personal relationship with the adolescent, and negotiating and providing incentives for positive behavior patterns. However, retention of the study samples has limited conclusions that can be drawn from published studies. This randomized controlled trial recruited and randomized a national population sample of 1036 families to an intensive parenting intervention using telephone counseling or to a no-contact control group. At enrollment, eligible families had an eldest child between the ages of 10–13 years. The intervention included an initial training program using a self-help manual with telephone counselor support. Implementation of best parenting practices was encouraged using quarterly telephone contacts and a family management check-up questionnaire. A computer-assisted structured counseling protocol was used to aid parents who needed additional assistance to implement best practices. This, along with a centralized service, enabled implementation of quality control procedures. Assessment of problem behavior is undertaken with repeated telephone interviews of the target adolescents. The study is powered to test whether the intervention encouraging parents to maintain best parenting practices is associated with a reduction of 25% in the incidence of problem behaviors prior to age 18 years and will be tested through a maximum likelihood framework.

Keywords

adolescent; family; parent; parenting; prevention; problem behavior; smoking; telephone counseling; tobacco

Introduction

A major goal for parents and for society is that children reach adulthood without having developed what are considered problem behaviors. Problem behaviors include: a) substance use/abuse (most commonly cigarettes, alcohol, or marijuana); b) internalizing disorders such

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as depression, anxiety, hostility and anger; and c) externalizing disorders including status offenses (those not proscribed for adults, e.g. truancy; sexual activity, particularly unprotected; and antisocial behavior that starts with stealing and bullying and may escalate to violence or property crimes) [1]. There is considerable evidence that problem behaviors cluster within individuals [2].

Individuals without strong bonds to social institutions (such as the family) are likely to think and behave unconventionally and belong to unconventional and risk-taking peer groups [3]. The family and home environment have been identified as the most important factors associated with teen avoidance of problem behaviors [4]. There is now considerable consensus identifying the following set of parenting practices as critical to positive youth development: a) relationship-building skills, b) limit-setting, c) positive reinforcement, d) monitoring, and e) conflict resolution [5–10].

Parental monitoring in the context of positive parent-teen relationships and communication is a key protective factor for limiting access to a deviant peer group and reducing peer influences on youth problem behavior [11,12]. While developing autonomy is part of the adolescent process, how and when parents grant autonomy appears to be one of the critical factors in preventing problem behaviors. Unsupervised free time, particularly at night and on weekends, is a strong predictor of problem behaviors in multiple studies [13–15]. Several school-based studies have demonstrated that parent training leads to improved implementation of best parenting practice among parents with problem adolescents and that these improvements appear to reduce substance use and other problem behaviors [16–18]. However, few studies investigate whether such changes can be maintained through adolescence.

There are a number of reasons why even motivated parents with sound knowledge of recommended best parenting practices may have difficulty in maintaining implementation of recommended best practices throughout adolescence. The capability to implement known best practice is often disrupted by parental stressors such as separation or divorce, job loss [19], increased work hours [8], or even by a generalized growing disaffection (depression) and long-term disadvantage [20]. Culture and the media convey consistent negative images of parent-teen relationships that undermine parent morale and self-efficacy [10]. Low self-efficacy can lead to parental disengagement from their adolescent. One example is when the parent initially responds negatively to evidence of a problem behavior, triggering a defiant response from the adolescent. Should this spiral with further negativity from the parent, the parent-child conflict can escalate quickly. Usually, it is the parent who is the first to back down often with a significant lowering of their self-efficacy for parenting[10]. Careful attention to maintaining relationship building and negotiation skills can avoid such negative consequences.

In this study, we hypothesized that training parents in recommended best practices would lead to short-term improvements in their parenting. Further, we hypothesized that an extended implementation intervention would help if it used telephone-based motivational interviewing techniques [21] to encourage maintenance of these practices in the face of multiple stressors and situations. Maintenance of these best parenting practices should result in lower rates of problem behaviors in adolescents, as measured in multiple longitudinal surveys of teens.

Overview of Study Design

The Parenting to Prevent Problem Behaviors Project is a randomized trial of a national population sample of 1036 families whose oldest child was aged 10–13 years at baseline (Figure 1). This study identified eligible families from respondents to a random survey of the United States population and invited them by mail to participate in the study. Baseline telephone surveys were completed with the parent who had most say in the care of the oldest

child as well as with the target adolescent. Using data from these surveys, families were randomized to intervention or comparison groups.

The intervention, which was delivered by trained lay facilitators, was divided into two major components: a training phase and an implementation phase. The training phase included a self-help manual mailed to participating families, with assistance in working through the manual provided by scheduled telephone calls with a lay facilitator who was assigned to the family. The implementation phase is organized around scheduled quarterly telephone calls during which the assigned facilitator follows a computer-assisted structured counseling script. Study assessments are telephone interviews undertaken by a trained assessor who is blinded to study group. Six adolescent and four parent interviews are completed with each participating family from baseline through age 18 years of the target adolescent.

Enrollment of Study Participants

Between May and August 2003, Westat (our subcontracted survey firm) conducted random digit dialed surveys using a national sampling frame that oversampled areas known to have high densities of African-Americans. A total of 57,000 households were enumerated and 4,781 (8.4%) met the criteria of having an oldest child at home who was 10–13 years of age. All were asked to express interest in participating in a future study by providing a name and address for further contact. Introductory letters were sent to the 3079 (64%) who provided an address. Mailings were sent to a systematic sub-sample of 220 of these volunteers each month (starting with the oldest adolescents) from August 2003 through October 2004 in order to manage recruitment and not overload study staff. The letter outlined the study goals and requested that the family accept a telephone survey related to the study. During the study-specific screening interview, which was carried out by WESTAT staff prior to randomization, we were unable to reach 1,006 potential respondents (either disconnected phone or non-response to 18 callbacks at different times of day and week). A further 819 were outside the range of eligibility for the study (e.g., adolescent already aged 14 years). We were unable to complete both the parent and child 30-minute baseline interviews with 218 families. Our final total enrollment was 1,036 families. Thus, active refusal rate was 17% and the enrollment efficiency rate (enrollees/estimated eligible enrollees) was 36%.

Representativeness of the Enrolled Sample

We compared our sample to national population estimates from households with an oldest child age 15 (the lowest age with data) from the 2001/2002 Current Population Survey of the US Census Bureau, the source for updating US census statistics. Nationally, these 15 year olds should be demographically similar to a national sample of our target population.

Table 1 shows that our study population slightly under-enrolled the Hispanic/other category (this was expected as we did not screen or offer the program in Spanish), and slightly over-enrolled African Americans and 2 parent households. African American over-representation was achieved by the sampling design. Our requirement that the target teen live with a legal parent or guardian may have influenced the proportion of 2 parent families enrolled. Educational level of the enrolled parent is similar to national estimates, with 58% of the sample and 60% of parents nationally in these households having attended some college.

Comparability of Randomized Groups at Baseline

Randomization was undertaken automatically by a computer program after first entry of an enrolled family into the study's relational database at UCSD. A random number generator and a permuted block design were used to allocate families within each of the following two-level strata: region of the country, parental smoking, child smoking risk, and hours out at night. At

the completion of randomization, 514 families were in the intervention group and 522 in the comparison group.

Table 2 presents the comparability of groups achieved by the randomization procedure. The groups were very comparable on demographics. Two thirds of each group resided in either the Mid-Western or Southern regions of the country, reflecting the screening survey's over-sampling of African American households. There were a few more Midwesterners in the Intervention group and a few more Southerners in the Control group.

The groups were also very comparable on variables that predict future adolescent initiation with smoking. These variables included: individual cognitions and behavior about smoking, best friend a smoker, parental smoking, and receptivity to tobacco advertising (favorite ad and willing to use promotional item). There were no significant differences between study groups on susceptibility or ever use of cigarettes, alcohol or marijuana. There was also close comparability between groups in family management practices (monitoring, limit setting, parental conflict issues and responsiveness). Compared to similarly aged adolescents on the 2003 USDHHS National Survey on Drug Use and Health (NSDUH), our sample was at least as likely to use substances as the general population, where 34% of 13 year olds were at risk for cigarette smoking.

There were also no differences between the study groups in any of the important parenting variables at baseline. Regarding tobacco-specific parenting, 43% of the parent sample reported discussing tobacco use in the past year, 52% reported having discussed consequences for tobacco use, and 3% reported having a reward agreement for not using tobacco. In addition, 86% reported using rewards and 62% using punishments regarding helping around the house. Regarding media monitoring, 62% reported TV in the teen's bedroom, 88% checked ratings on video games, and 72% limited TV watching and game playing. Eating dinner together with the teen at least five nights per week was reported by 85% of parents, although a quarter had the TV on at the same time. About a third of parents reported that the teen was doing better than expected in school, and about 20% reported the teen was doing worse than expected.

Details on the Study Intervention

The purpose of the training phase was to ensure that all intervention group participants would have a similar knowledge base for best parenting practice as their oldest child was starting adolescence. For this phase of the intervention, all participants were sent a study-developed self-help manual that presents the consensus best parenting practices in 12 chapters organized into three modules: building positive behaviors, setting effective limits, and relationship building. Although not mandated, participants were encouraged to work through this manual with a telephone facilitator who was assigned to the family for the duration of the intervention.

The main component of the intervention aimed to ensure the establishment of best parenting practice habits that are maintained in the face of situational stressors. For this intervention, study facilitators used the techniques of motivational interviewing standardized through a computer-assisted telephone counseling script. Telephone contacts were scheduled with the parent approximately every three months (maximum 7 months). This computer-assisted script started with a short assessment survey on any major issues with the targeted teen on 10 separate topics related to substance use, antisocial behavior, or internalizing issues such as moodiness. Utilization of best parenting practices were reviewed and recommended. The principles of motivational interviewing focused on the facilitator empathizing with the parent, posing questions particularly about goal setting for potential future problems, and careful listening. Change was motivated if parents perceived a discrepancy between what was done compared to recommended practice, particularly if they were not completely happy with their own

performance. The parent's self efficacy was built by strong facilitator encouragement and by the facilitator's favorable evaluation of achievements.

As this is a prevention program in a generally healthy population, on a very rare occasion, the facilitator contact might result in the need for clinical intervention or assessment. The study's clinical psychologist provided hands-on supervision of facilitators, supervising regular case management and continuing education sessions as well as being on-call to take over any such crisis. In all such instances, the participant was encouraged to seek out local community professional resources. More common was the reporting of difficult parenting situations in which help was sought that extended beyond the quarterly call. The study had scripted 5 additional sets of calls (2 calls each) to handle commonly reported requests. Three of these were booster sessions on the modules covered in the training program. The other two covered the topics of teen sexuality and substance use.

Throughout each of these calls, the facilitator took on the role of consultant librarian for the participant. In this role, the facilitator searched the internet and also the substantial study library for reference material that might be helpful to the current situation of the parent. Previously researched and approved information sheets and additional references were provided either electronically or by mail.

Each of these quarterly calls finished with the participating parent being prompted to set proximal goals to further improve family management practices. At the end of the call, the facilitator provided a score of parental progress and provided a detailed text commentary on any important issue that was mentioned during the call. The purpose of this was twofold. Facilitators were required to read the detailed commentary before the next scheduled call thus ensuring that the facilitator was up-to-date on the issues that the participating parent was concerned about. Additionally, these notes provide an ongoing history of parenting issues in the family throughout adolescence.

Standardizing and Controlling Intervention Quality

The study used a rigorous selection process for non-professional facilitators focused on people with knowledge of best parenting practices, and an aptitude for motivational interviewing and for following study protocols. Possession of significant basic computing skills was required. The study used computer-assisted telephone counseling scripts to ensure that a similar approach was taken with all intervention participants. All facilitators completed a 60-hour training program that included role-playing interviews to demonstrate mastery of the computer-assisted interviewing approach. Case management review meetings led by the study's clinical psychologist were conducted at least twice per month. All facilitators were asked to audiotape calls; the choice of calls and the frequency was decided by counseling management staff. These tapes were reviewed with the clinical psychologist, senior counselors, and peer facilitators to assess fidelity to the standard protocol. Finally, participants were asked to mail in confidential evaluations of facilitators at the 90-day study time point. The computer-assisted protocol required each facilitator to document participant progress and barriers during each contact. The protocol prompted detailed participant notes to assist with a smooth transfer to another study facilitator should that be necessary. The documentation of each call was reviewed by the study supervisors on an ongoing basis.

Study Assessments

Data are collected using computer-assisted telephone interview (CATI) surveys with trained assessors blinded to the participant's study group. There are a total of 8 adolescent questionnaires and 4 parent questionnaires throughout the study to provide snapshots of

parenting practices, parent-child relationships and variables associated with problem behaviors. The content of each of these surveys is presented in Table 3.

Outcome Questions

Tobacco use is sought with 15 questions from the standard set used in national and state telephone surveys and for which we have demonstrated validity in multiple studies [22–24]. *Alcohol use* questions are those used in the Oregon Healthy Teens Study [25] and *marijuana use* are from the national Youth Risk Behavior Survey [26]. The 7 Questions on *High-risk Sexual Activity* are also from the YRBS [26] and in this study will not be asked before age 16 years. We use a 6 item scale ($\alpha = 0.65$) to assess *teen antisocial behavior* such as bullying, damaging property, and stealing [27].

Parenting Constructs

Monitoring

A 9 item Likert-type Parental Monitoring Scale [28] asks teens about the information they give their parents about their activities and whereabouts. ($\alpha=0.90$) We also ask teens 8 questions from the Strictness/Supervision index [29]. The parent is asked 4 questions about the kinds of activities their teen does with friends, including hanging out at home, playing sports, etc. ($\alpha=0.84$).

Limit Setting

We ask both the teen and parent the total number of hours the teen is typically allowed to stay out during the school week and on weekends. Adolescents are given hourly increments (i.e. between 8.00 to 8:59 pm). Total hours allowed out are estimated for the week. This index has been shown to be a strong predictor of later tobacco use [30]. Additionally, we ask parents 7 items ($\alpha = 0.71$) on limit setting on teen media use from the Kaiser Family Foundation media studies [31]. For parents, we also used an 18 item checklist (KR_8=0.75) on home rules designed for middle to high school students [32].

Responsiveness

For teens, we use the 9-item ($\alpha= 0.84$) responsiveness scale [29,33] and the 9-item ($\alpha= 0.89$) Likert type Parent-Child Closeness scale [34] and the 10 item ($\alpha= 0.77$) Family Cohesion Evaluation scale. For parents, we use the 4-item ($\alpha=0.67$) responsiveness measure from the “Why Family Matters” study [35]. We also developed and pre-tested a checklist of 10 common parent-teen current conflict issues (Parent $\alpha=0.71$; Teen $\alpha= 0.68$).

Use of Incentives, Rewards and Punishments

We ask parents a total of 11 questions on the detailed parental use of incentives and punishments for differing adolescent behaviors including academic performance, substance use, and helping out around the house.

Parental Stress and Self-efficacy

The 18 item ($\alpha= 0.83$) Parental Stress Scale [36] covers a range of topics including satisfaction with parenting role, difficulties associated with parenting, and positive-negative emotions related to being a parent.

Predictors of Outcome Variables

Following previous work [37], we measured *Exposure to Substance Use in the Social Network* by asking teens the frequency of use of tobacco and alcohol among their best friends.

We asked whether the teen knew anyone who used any of 9 substances including marijuana and cocaine. We also asked about availability of cigarettes and alcohol in the home. *Rebelliousness* was measured using the validated [38] 6 item teen rebelliousness scale ($\alpha=0.65$) used in previous research [39–42]. *Depressive Symptoms*: was measured with the 6 item ($\alpha=0.78$) Kandel's Depressive Symptoms Scale [43]. For *Academic Performance*, we asked teens to classify how they performed in school. This question has consistently predicted smoking behavior in follow-up surveys [38]. We asked parents how well their child was performing in school with 6 choices from straight A's to some F's with a follow-up question on how well this performance met their expectations (better/same/worse). We also measured *Teen Receptivity to Tobacco Marketing* with the four level previously validated index [30, 44–47].

Cohort Maintenance Strategies

The Cochrane review notes that cohort maintenance has been a major problem with parenting studies [48]. We have implemented a variety of study activities designed to remind and update participants about the project and to reward them for completing various study tasks. The study puts out a semi-monthly *newsletter* for both study groups that includes a presentation on a relevant parenting topic with parenting tips, reviews of other resources, and a question-and-answer forum. All participants, both parents and adolescents, are mailed birthday cards each year about one week prior to their birthdates.

Additionally, the study has an *incentive program* that provides money for completion of study assessments. Youth participants are rewarded with a financial incentive immediately each time they complete a follow-up survey. For parents, the incentive program rewards each study activity requested of both intervention and control groups with points, which may be redeemed for cash at any time. Study activities for which parents earn incentive points include: semi-annual contact calls, youth completion of follow-up surveys, parent completion of follow-up surveys, and updates to contact information.

Study Power and Statistical Issues

Primary hypothesis

Adolescents from intervention group families will be 30% less likely to become adult established smokers by age 18–20 years than those from comparison group families.

The study is powered for the primary hypothesis. Participant loss to follow-up has been a major problem in parenting studies [48]. Accordingly, we calculate power for our expected loss to follow-up of 6%/year as well as for a very conservative estimate of 12%/year (Table 4). We used the latest estimates of adult current established smoking rates for 18–20 year-olds in the most similar national survey (NSDUH). At attrition of 6%/yr we will have 80% power to detect a 25% effect size. With higher rates of attrition (up to 12%/yr), we will have over 80% power to detect a 30% effect size from the intervention.

The statistical analysis for the primary hypothesis will use logistic regression, with a primary outcome of current adult established (100+ cigarettes) smoking at age 18 years. The baseline variables of age, race, gender, parental education, the adolescent's perception of school performance and the control variables used in the stratified randomization (region of the country, parental smoking status, child smoking risk, and parental level of limit setting) will be initially screened in a univariate analysis for association with the outcome variable, and variables significant at $p<0.20$ will be retained for further consideration. Retained baseline variables will be incorporated into a multivariate model, and retained in the final model at 10% significance level. As there is no evidence to suggest that a parental intervention on best

parenting practices could increase teen problem behavior, [10] a one-sided primary hypothesis test is justified. The treatment effect will be presented as a 95% confidence interval on the relative odds of smoking in the intervention vs. the comparison group. Subgroup analyses will present similar estimated effect sizes by for example gender and ethnicity of the parent, as further described below.

The primary analysis uses a maximum likelihood framework, adjusting for baseline covariates known to be predictors of both the study outcome and of loss to follow-up. Under the assumption that missing outcome data or drop-out are missing at random conditional on these covariates, the proposed modeling strategy would give unbiased estimates of treatment effect [49]. However it is likely that dropout from study assessment will be related to smoking status even given baseline covariates, and we will use a likelihood-based selection model with inverse probability weights to address potential bias from differential dropout [50,51]. First, the same set of baseline covariates as above will be used to predict dropout in a logistic regression model. For the intervention group we will also include level of use of assistance during the training phase as a potential covariate to predict dropout. The final multivariate selection model will be fitted separately for the intervention and control groups, and will retain variables significant at $p < 0.10$. Predicted probabilities of loss to follow-up from this selection model will then be used as inverse probability weights in the final logistic regression model which tests for a treatment effect [51]. We will present the final model testing efficacy of the treatment using both weighted and un-weighted logistic regression, and a comparison of the results will provide an estimate of the likely size and direction of bias from differential study drop out. As additional benchmark, the most conservative estimate in which all missing data are imputed as smoking will be presented as the worst-case scenario.

Discussion

There is considerable evidence to suggest that parenting practice is a major determinant of the development of adolescent problem behaviors. However, definitive studies have been limited by difficulty in retaining participants. A potential reason for this low continued participation is the participant burden involved in coming to group sessions at a time when parents need to be interacting with their teens.

A major strength of this project is the use of a telephone intervention that is scheduled at the parent's convenience. This obviates the need for organizing child supervision during the session as well as provides the opportunity to tailor the intervention to the specific needs of the family. Further, it allows the study to have a national focus with a reasonable budget. The use of motivational interviewing, rather than a more didactic approach to the intervention, keeps responsibility for parenting decisions with the parent and avoids potential cultural and belief issues that are also associated with decreased enthusiasm for parenting interventions. The study has built a large quality-controlled electronic and print database of resources that might be helpful to parents in a wide variety of situations. Dissemination of these resources to parents at time of need is a significant service that is likely to build enthusiasm for the intervention.

The study is also innovative in that it allows for a high level of quality control of the intervention. Study facilitators are in a central location which enables regular case-management meetings with the clinical psychologist to discuss a uniform study-wide response to common problems that are raised. Calls can be easily audio-taped for fidelity review. The computer-assisted counseling program enables a detailed review of the intervention and the parent's response across calls. Thus, a standardized intervention is likely to be much more uniformly implemented across the study than in previous interventions in the field.

A strength of the study lies in the serial assessments of both the parent and the teen throughout the adolescent years. There is a dynamic interaction between parenting practices, teen response and environmental influences over the adolescent years and multiple surveys of current status, combined with careful statistical analysis, will allow these effects to be teased apart. A second strength is that the primary study outcome relies only on the teen's self-report of behavior. This avoids possible demand pressures that occur when the study outcome is reported by the main intervention participant (the parent). The study incentive program is aimed at ensuring a high ongoing response rate to all surveys.

This study has some limitations. Randomization was stratified on a baseline risk variable which combined susceptibility to smoking and curiosity about smoking into a single measure. This resulted in a small yet significant between-group difference in each component that could bias toward the null hypothesis. We expect that the effect of this imbalance will be small, and we will quantify and control for this in our secondary statistical analyses. Further, the assessment of study outcome does not have an objective measure outside of the family unit. While it might be desirable for example to have a biomarker to verify self-reported substance use at least at age 18 years, adding such a measure to a large nationally representative sample has a prohibitive cost for the small improvement in validity [52]. That this study continues to follow the target adolescent through 18 years will minimize bias from under-reporting [53].

Summary

This is the first population-based study that we know of to investigate the role of parenting practice in preventing problem behaviors among adolescents. It has drawn a national sample of families and enrolled a high proportion of those eligible into the study. It uses a comprehensive set of assessments over the adolescent years from which the longitudinal trajectory of problem behaviors will be clearly drawn. The study has the power to identify the role of best parenting practices in preventing adolescent problem behaviors.

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References

1. Steinberg, L. Adolescence. 6. McGraw-Hill; 2002.
2. Jessor, R.; Jessor, S. Problem behavior and psychosocial development: A longitudinal study of youth. New York: Academic Press; 1977.
3. Soenens B, Vansteenkiste M, Luyckx K, Goossens L. Parenting and adolescent problem behavior: An integrated model with adolescent self-disclosure and perceived parental knowledge as intervening variables. *Dev Psychol* Mar;2006 42:305–318. [PubMed: 16569169]
4. Blum, R.; Reinhart, P. Reducing the risk: Connections that make a difference in the lives of youth. Minneapolis: Division of General Pediatrics and Adolescent Health, University of Minnesota; 2000.
5. Hawkins J, Catalano RJM. 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]
6. Patterson, G.; Reid, J.; Dishion, TJ. Antisocial boys. Eugene, OR: Castalia; 1992.
7. Kumpfer KL, Turner CW. The social ecology model of adolescent substance abuse: Implications for prevention. *Int J Addict* 1990;25:435–463. [PubMed: 2093088]
8. Kumpfer KL, Alvarado R, Whiteside HO. Family-based interventions for substance use and misuse prevention. *Subst Use Misuse* Sep-Nov;2003 38:1759–1787. [PubMed: 14582577]
9. CSAP. The national cross-site evaluation of high risk youth programs: Final report. Rockville, MD: Center for Substance Abuse Prevention, Substance Abuse and Mental Health Services Administration; 2000.

10. Simpson, A. Raising teens: A synthesis of research and a foundation for action. Center for Health Communication, Harvard School of Public Health; 2001.
11. Dishion TJ, McMahon RJ. Parental monitoring and the prevention of child and adolescent problem behavior: A conceptual and empirical formulation. *Clin Child Fam Psychol Rev* Mar;1998 1:61–75. [PubMed: 11324078]
12. Kerr M, Stattin H. What parents know, how they know it, and several forms of adolescent adjustment: Further support for a reinterpretation of monitoring. *Dev Psychol* May;2000 36:366–380. [PubMed: 10830980]
13. Benson M, Harris P, Rogers C. Identity consequences of attachment to mothers and fathers among late adolescents. *Journal of Research on Adolescence* 1992;2:187–204.
14. Buckhalt JA, Halpin G, Noel R, Meadows ME. Relationship of drug use to involvement in school, home, and community activities: Results of a large survey of adolescents. *Psychol Rep* Feb;1992 70:139–146. [PubMed: 1565712]
15. Galambos NL, Barker ET, Almeida DM. Parents do matter: Trajectories of change in externalizing and internalizing problems in early adolescence. *Child Dev* Mar-Apr;2003 74:578–594. [PubMed: 12705574]
16. Dishion, TJ.; Kavanagh, K. Intervening in adolescent problem behavior: A family centered approach. New York: Guilford Press; 2003.
17. Santisteban DA, Coatsworth JD, Perez-Vidal A, et al. Efficacy of brief strategic family therapy in modifying hispanic adolescent behavior problems and substance use. *J Fam Psychol* Mar;2003 17:121–133. [PubMed: 12666468]
18. Schmidt S, Liddle H, Dakof G. Changes in parenting practices and adolescent drug abuse during multidimensional family therapy. *Journal of Family Psychology* 1996;10:12–27.
19. Conger RD, Conger KJ, Elder GH Jr, et al. A family process model of economic hardship and adjustment of early adolescent boys. *Child Dev* Jun;1992 63:526–541. [PubMed: 1600820]
20. McLoyd V. The impact of economic hardship on black families and children: Psychological distress, parenting, and socioemotional development. *Child Dev* 1990;61:311–346. [PubMed: 2188806]
21. Miller, WR.; Rollnick, S. Motivational interviewing: Preparing people for change. New York, NY: The Guilford Press; 2002.
22. Pierce JP, Choi WS, Gilpin EA, Farkas AJ, Merritt RK. Validation of susceptibility as a predictor of which adolescents take up smoking in the united states. *Health Psychol* Sep;1996 15:355–361. [PubMed: 8891714]
23. Jackson C. Cognitive susceptibility to smoking and initiation of smoking during childhood: A longitudinal study. *Preventive Medicine* 1998;27:129–134. [PubMed: 9465363]
24. Choi WS, Gilpin EA, Farkas AJ, Pierce JP. Determining the probability of future smoking among adolescents. *Addiction* Feb;2001 96:313–323. [PubMed: 11182877]
25. Biglan, A.; Smolkowski, K. Intervention effects on adolescent drug abuse and critical influences on the development of problem behavior. In: Kandel, DB., editor. Stages and pathways of drug involvement: Examining the gateway hypothesis. New York, NY: Cambridge University Press; 2002. p. 158-183.
26. YRBS. 2005 state and local youth risk behavior survey. [Accessed 2/23/2006]. Available at: <http://www.cdc.gov/HealthyYouth/yrbs/pdfs/2005highschoolquestionnaire.pdf>
27. Burney DM, Kromrey J. Initial development and score validation of the adolescent anger rating scale. *Educational and Psychological Measurement* 2001;61:446–460.
28. Small S, Luster T. Adolescent sexual activity: An ecological, risk factor approach. *Journal of Marriage and the Family* 1994;56:181–192.
29. Steinberg L, Lamborn SD, Dornbusch SM, Darling N. Impact of parenting practices on adolescent achievement: Authoritative parenting, school involvement, and encouragement to succeed. *Child Dev* Oct;1992 63:1266–1281. [PubMed: 1446552]
30. Pierce JP, Distefan JM, Jackson C, White MM, Gilpin E. Does tobacco marketing undermine the influence of recommended parenting in discouraging adolescents from smoking? *American Journal of Preventive Medicine* 2002;23:73–81. [PubMed: 12121794]
31. Kaiser, Family, Foundation. Parents, media, and public policy. Menlo Park, CA: Kaiser Family Foundation; 2004.

32. Epstein, J. Longitudinal study of school and family effects on student development. In: Mednick, S.; Harway, M.; Finello, K., editors. *Handbook of longitudinal research*. 1. New York: Praeger; 1984.
33. Baumrind D. Parental disciplinary patterns and social competence in children. *Youth & Society* 1978;9.
34. Buchanan CM, Maccoby EE, Dornbusch SM. Caught between parents: Adolescents' experience in divorced homes. *Child Dev* Oct;1991 62:1008–1029. [PubMed: 1756653]
35. Bauman KE, Ennett ST, Foshee VA, Pemberton M, Hicks K. Correlates of participation in a family-directed tobacco and alcohol prevention program for adolescents. *Health Educ Behav* Aug;2001 28:440–461. [PubMed: 11465156]
36. Berry J, Jones W. The parental stress scale: Initial psychometric evidence. *Journal of Social and Personal Relationships* 1995;12:463–472.
37. Pierce JP, Farkas AJ, Evans N, et al. Tobacco use in California 1992. A focus on preventing uptake in adolescents. 1993
38. Gilpin EA, Lee L, Pierce JP. How have smoking risk factors changed with recent declines in California adolescent smoking? *Addiction* Jan;2005 100:117–125. [PubMed: 15598199]
39. Distefan JM, Gilpin EA, Sargent JD, Pierce JP. Do movie stars encourage adolescents to start smoking? Evidence from California. *Prev Med* Jan;1999 28:1–11. [PubMed: 9973581]
40. Hansen WB, Collins LM, Johnson CA, Graham JW. Self-initiated smoking cessation among high school students. *Addict Behav* 1985;10:265–271. [PubMed: 4083103]
41. Sussman S, Dent CW, Galaif ER. The correlates of substance abuse and dependence among adolescents at high risk for drug abuse. *J Subst Abuse* 1997;9:241–255. [PubMed: 9494952]
42. Albers AB, Biener L. The role of smoking and rebelliousness in the development of depressive symptoms among a cohort of Massachusetts adolescents. *Prev Med* Jun;2002 34:625–631. [PubMed: 12052023]
43. Kandel DB, Davies M. Epidemiology of depressive mood in adolescents: An empirical study. *Arch Gen Psychiatry* Oct;1982 39:1205–1212. [PubMed: 7125850]
44. Pierce JP, Choi WS, Gilpin EA, Farkas AJ, Berry CC. Tobacco industry promotion of cigarettes and adolescent smoking. *JAMA* Feb 18;1998 279:511–515. [PubMed: 9480360]
45. Gilpin EA, White MM, Messer K, Pierce JP. Receptivity to tobacco advertising and promotions as young adults predicts current established smoking as young adults. *American Journal of Public Health*. In press
46. Biener L, Siegel M. Tobacco marketing and adolescent smoking: More support for a causal inference. *Am J Public Health* Mar;2000 90:407–411. [PubMed: 10705860]
47. Sargent JD, Dalton M, Beach M, et al. Effect of cigarette promotions on smoking uptake among adolescents. *Prev Med* Apr;2000 30:320–327. [PubMed: 10731461]
48. Gates S, McCambridge J, Smith LA, Foxcroft DR. Interventions for prevention of drug use by young people delivered in non-school settings. *Cochrane Database Syst Rev* 2006;CD005030. [PubMed: 16437511]
49. Little, RJ.; Rubin, DB. *Statistical analysis with missing data*. New York: Wiley; 2002.
50. Molenberghs G, Thijs H, Jansen I, et al. Analyzing incomplete longitudinal clinical trial data. *Biostatistics* Jul;2004 5:445–464. [PubMed: 15208205]
51. Rotnitzky A, Robins J, Scharfstein D. Semiparametric regression for repeated outcomes with nonignorable nonresponse. *Journal AMER STATIST ASSOC* 1999;93:1321–1339.
52. Caraballo RS, Giovino GA, Pechacek TF. Self-reported cigarette smoking vs. Serum cotinine among U.S. Adolescents. *Nicotine Tob Res* Feb;2004 6:19–25. [PubMed: 14982684]
53. Biglan M, Gilpin EA, Rohrbach LA, Pierce JP. Is there a simple correction factor for comparing adolescent tobacco-use estimates from school- and home-based surveys? *Nicotine Tob Res* Jun;2004 6:427–437. [PubMed: 15203776]

Figure 1.
Study design

Table 1

Representativeness of study population

		US population%	Baseline n=1036
Child's gender	Male	52	51
Child's race/ethnicity	White	65	69
	African American	16	18
	Hispanic/Other	18	16
2-parent household	Yes	67	75
Parent education	College	60	58

Table 2

Baseline comparability of groups

	Intervention %	Control %
Child's gender		
Male	51.6	50.2
Child's race/ethnicity		
White	58.2	60.6
African American	23.2	19.1
Hispanic/Other	18.6	20.3
Parent's race/ethnicity		
White	65.4	68.1
African American	21.0	17.3
Hispanic/Other	13.6	14.6
Child's age at baseline (mean)	12 years	11.9 years
% above average at school	23.6	23.7
Region of country		
Northeast	15.2	15.9
Midwest	27.4	23.0
South	38.7	42.3
West	18.7	18.8
Smoking & other risk variables		
At risk for cigarette smoking	42.0	42.5
Ever Experimenter	5.3	5.2
Live with a smoker	39.1	38.9
Live in smokefree home	63.0	65.3
% with best friends smoke	14.2	13.0
Favorite cigarette ad	37.6	35.8
Might use promotional item	30.5	28.0
At risk to smoke marijuana	11.3	11.5
Ever smoked marijuana	2.0	2.5
Know marijuana smoker	13.6	14.4
At risk to drink alcohol	52.5	54.0
Drunk alcohol without adult	6.8	4.4
Family member drink heavily	8.0	10.5
Friends drink heavily	6.0	4.4
Parenting variables		
Mean responsiveness score	1.71	1.67
Hours allowed out at night	10.2 hrs	10.7 hrs
Strong parental movie monitoring	59.0	60.9
Frequent parent conflict issues	65.4	68.1
Cleaning room	36.4	33.5
Fighting siblings	35.6	33.1
Homework	24.9	27.0
Household chores	24.9	26.6
Bedtime	18.7	19.7
Watching TV/videos	14.6	15.3

Table 3

Frequency of measures

	T	T	T	T	T	P	P	P	P
	1	2	3	4	5	1	2	3	4
Outcome measures									
Alcohol use	X	X	X	X	X				
Anti-social behavior	X	X	X	X	X				
High-risk sexual activity									
Marijuana use	X	X	X	X	X				
Tobacco use	X	X	X	X	X				
Parenting constructs									
Limit setting	X	X	X	X	X	X	X	X	X
Monitoring	X	X	X	X	X	X	X	X	X
Responsiveness	X	X	X	X	X	X	X	X	X
Presence of rules									
Parental stress and self-efficacy									
Use of incentives, rewards, punishment	X	X	X	X	X	X	X	X	X
Teen-parent substance use beliefs	X	X	X	X	X	X	X	X	X
Tobacco specific parenting	X	X	X	X	X	X	X	X	X
Predictors of outcome variables									
Academic performance	X	X	X	X	X	X	X	X	X
Depressive symptoms	X	X	X	X	X				
Parent-teen conflict issues (hot issues)	X	X	X	X	X	X	X	X	X
Rebelliousness	X	X	X	X	X				
Receptivity to cigarette marketing	X	X	X	X	X				
Substance use in social network	X	X	X	X	X				

Table 4

Attrition %/year	n	Effect size		
		0.25	0.3	0.35
6	626	0.80	0.91	0.97
8	562	0.76	0.88	0.96
10	504	0.72	0.85	0.94
12	450	0.68	0.82	0.91