

# The Linking Lives Health Education Program: A Randomized Clinical Trial of a Parent-Based Tobacco Use Prevention Program for African American and Latino Youths

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Each day in the United States, more than 4000 adolescents aged 12 to 17 years try their first cigarette.<sup>1</sup> If current smoking patterns continue, an estimated 6.4 million of today's children can be expected to eventually die from a smoking-related disease.<sup>2</sup> Ethnic and racial disparities in smoking-related morbidity and mortality are well-documented. Data suggest that African Americans and Latinos are particularly vulnerable to the negative consequences of tobacco use.<sup>3,4</sup>

Research suggests that parents can play an important role in preventing cigarette smoking among African American and Latino youths.<sup>5–8</sup> Parenting processes associated with protective effects include parent-adolescent communication about tobacco use,<sup>9</sup> parental disapproval of smoking,<sup>8</sup> and the institution of parental rules that discourage smoking.<sup>10,11</sup> In addition, studies have documented inverse relationships between high levels of parent-adolescent connectedness and involvement with adolescent smoking.<sup>12–14</sup>

In recent years, a number of interventions have involved parents to prevent adolescent tobacco use.<sup>15–19</sup> A recent systematic review identified 22 randomized clinical trials of family-based interventions to prevent smoking; of these, the reviewers deemed 17 to be methodologically sound.<sup>20</sup> Of these 17 studies, 9 tested a family intervention against a no-treatment control group, and 4 of those 9 yielded statistically significant positive effects; 1 study that compared a family-based intervention with a school-based intervention found the family-based intervention to be more effective, and of the 7 studies that evaluated whether a family-plus-school program had incremental effects as compared with a school program alone, none yielded significant effects.<sup>20</sup> Most of the intervention studies that used parent-based add-on components were not realistic from a practical

**Objectives.** We evaluated the effectiveness of a parent-based add-on component to a school-based intervention to prevent cigarette smoking among African American and Latino middle school youths.

**Methods.** Mother-adolescent dyads (n=1386) were randomly assigned to 2 groups: (1) a school-based smoking-prevention intervention or (2) the same intervention with a parent-based add-on component called Raising Smoke-Free Kids. Mothers in the experimental condition received the parent add-on component. Mothers in the control condition received information on selecting a high school. All adolescents received a version of Project Towards No Tobacco Use (TNT). The primary outcome was a reduction in adolescent cigarette smoking. Follow-up data were obtained from 1096 mother-adolescent dyads at 15 months postintervention.

**Results.** At follow-up, the odds of smoking cigarettes were reduced by 42% for adolescents in the parent add-on condition versus the TNT-only condition. Mothers in the parent add-on condition were more likely than were mothers in the TNT-only condition to set rules about risk-sensitive social activities and to be perceived as trustworthy by their child. Group differences also were found in the frequency and quality of mother-adolescent communication.

**Conclusions.** Including parent add-on components in school-based smoking prevention programs can reduce smoking behavior on the part of inner-city middle school youths. (*Am J Public Health.* 2010;100:1641–1647. doi:10.2105/AJPH.2009.171637)

standpoint, lacked a theoretical basis, or suffered from methodological limitations.

When tests evaluate whether parent-based add-on components have incremental effects over and above a nonparent intervention, a demanding standard is being set. This is because the parent add-on component is judged to be effective only to the extent that it affects youths whom the original program was unable to affect, and such youths are likely to be more resistant to change than were those affected by the original program. Although none of the tobacco-focused programs in the systematic review showed incremental effects,<sup>20</sup> we located 2 HIV-prevention programs that found a parent add-on component to have incremental effects on cigarette smoking. Wu et al.<sup>19</sup> tested whether a parental monitoring add-on incrementally affected multiple risk behaviors, including cigarette

smoking, as compared with an HIV-prevention program alone. The researchers reported an incremental effect on whether the adolescent had ever smoked a cigarette at the 6-month follow-up but not at the 12-month follow-up.<sup>19</sup> Prado et al.<sup>18</sup> evaluated an incremental effect of a parent add-on for an HIV-prevention program aimed at sexual risk behavior and for a program aimed at cardiovascular health that directly addressed smoking (HeartPower! for Hispanics; the HEART program). They found no evidence for incremental parent add-on effects on smoking for the HEART program, but they reported that the HIV program plus the parent add-on had a surprising long-term effect (36 months) on smoking, compared with the HIV program alone.<sup>18</sup> It is unclear whether this is a reliable result.

Overall, previous studies of parent add-on programs have found limited evidence of

incremental effects on smoking relative to existing school-based programs aimed at preventing smoking in adolescence. For our study, we conducted a randomized clinical trial of a parent-based intervention to prevent cigarette smoking among inner-city African American and Latino youths in middle school. In contrast to past efforts, we used an add-on that was based on strong theories of behavior, extensive formative data yielding both adolescent and parental input for program design and delivery, and a structure that made parental involvement practical. The intervention was developmentally appropriate and was tailored to the ethnicity and urban context of the target population. The parent add-on program was called Raising Smoke-Free Kids and was developed as part of the Linking Lives Health Education Program, which was developed by V.G.R., J.J., and P.D. The theories and formative work that were the basis of the intervention are described elsewhere.<sup>7,9,21</sup> The stand-alone program we chose was the school-based Project Towards No Tobacco Use (TNT),<sup>22</sup> a well-known intervention with considerable efficacy data.<sup>23,24</sup>

## METHODS

African American and Latino mother–adolescent dyads were recruited from 6 middle schools in the Bronx and Harlem communities of New York City. Figure 1 provides a flow chart of the study of participants. A total of 1734 dyads were randomly selected to be contacted for the study. Bilingual callers telephoned parents or legal guardians of middle school students and invited the mother and adolescent to participate in a family-based program to prevent smoking among youths. Adolescents were eligible if they were African American or Latino and enrolled in grade 6 or 7. Resident mothers were eligible if they were aged 18 years or older and were primarily responsible for providing care for the target child. Callers scheduled interested mother–adolescent dyads to attend an in-school event for study enrollment and data collection.

A total of 1386 dyads (80% of those contacted) attended the event and participated in the study. Of the total families that participated, 1096 completed the study. Dyads unable to attend an in-school event were offered a home data-collection session; 102 of these accepted

(7.4%). A total of 348 of the 1734 randomly selected dyads (20.1%) could not be recruited into the study; 108 (6.2%) of these dyads refused to participate, and the remaining 133 dyads were scheduled but did not participate. A few mothers (2%) arrived at the data-collection event with an eighth-grade child, despite requests to attend the event with the target sixth- or seventh-grade child. In these instances, we did not feel we could turn the families away; therefore, the eighth-graders were recruited into the study. Refusal bias surveys were administered during recruitment to all but 35 dyads. There were no statistically significant differences on measures such as marital status, maternal education, and number of children between dyads who agreed to take the refusal bias survey and those who refused.

Mothers signed permission and consent forms, and adolescents signed assent forms. All forms were written in English and Spanish. For each assessment completed during the study, adolescents were compensated \$10, and mothers were compensated \$15.

At the scheduled in-school event, adolescents and parents went to separate rooms to complete forms assessing baseline measures. They were then randomly assigned by computer to 1 of 2 intervention conditions: the TNT-only condition or the TNT-plus-parent condition. All adolescents received the same intervention, an adaptation of TNT. Parents received either the Linking Lives parent-oriented add-on or a control curriculum about how to choose a high school (youths in New York City can choose their high school). The study began in January 2004 and was completed in September 2007.

### The Towards No Tobacco Use Intervention

TNT involves a 10-day classroom-based curriculum, with each lesson lasting approximately 45 minutes. A 2-lesson booster session is also available. The program includes a manual for teachers, 2 videos, and a student workbook. The complete intervention is not realistic for implementation in inner-city schools, such as the ones in which we worked. The intervention is long and too demanding of school resources, and it detracts from valuable classroom time. Therefore, we modified

the intervention to make it more feasible for implementation in our study schools.

The modified version of TNT was conducted over 2 face-to-face sessions, each lasting approximately 2.5 hours and delivered on separate days (primarily in the evenings and on weekends). Day 1 covered 4 components of TNT: (1) effective listening and tobacco information, (2) the course and consequences of tobacco use, (3) self-esteem, and (4) being true to one's self and changing negative thoughts. The content for day 2 addressed: (1) effective communication, (2) assertiveness training and refusal skills, (3) an examination of advertising images, and (4) social activism. Adolescents were given opportunities through games and other applied activities to practice the skills and use the content provided by the curriculum. Additionally, adolescents were given an activity workbook designed to further enhance the content of the curriculum. All materials were based on the original TNT curriculum and student workbook. The only original TNT component that was excluded was the use of the videos and videotaping as an instructional exercise, because of economic and time constraints. Our curriculum and materials were offered in either English or Spanish (adolescents could choose the language in which they received the materials).

### The Linking Lives Parent-Oriented Add-On Component

While adolescents received the TNT intervention, mothers received the Linking Lives intervention or the control intervention in different classrooms. The central component of the Linking Lives intervention was a written manual that focused on effective communication and parental monitoring strategies for preventing adolescent tobacco use. The manual consisted of 9 short modules written at a fourth-grade reading level and 2 tobacco-related homework activities for parents to use at home with their adolescent. One Spanish version and 2 English versions of the manuals were available; 1 of the English versions was tailored to Latino parents, and the other was tailored to African American parents. We used back-translation procedures to create the Spanish materials from the English versions.<sup>25</sup>

During the day 1 session, the modules were reviewed with parents. Principles from the

modules were discussed, including the concept that parents could make a difference in their adolescent's tobacco-related behavior, strategies for effective communication, topics parents might consider discussing in conversations with their adolescents, and the importance of setting limits for adolescents. The day 2 session focused on the 2 tobacco-related homework tasks: 1 focused on the consequences of smoking, and the other focused on ways to resist peer pressure to smoke. Mothers were given a booklet to give to their adolescents about not smoking cigarettes. Mothers also received 2 booster calls (1 month and 6 months after completing the intervention) from trained parent volunteers to determine whether they had implemented the manual's recommendations. Mothers in the control condition received comparable levels of attention and amounts of materials.

**Measures**

Mothers and adolescents completed self-administered surveys at baseline and at 15 months postintervention. Unless otherwise noted, responses to items were on 5-point scales (1=never, 2=sometimes, 3=a moderate amount of the time, 4=most of the time, 5=almost all of the time). All measures had been used in previous research with the target population and had been found to have good reliability (greater than 0.70) and concurrent validity.<sup>9,26</sup>

*Smoking behavior.* Adolescents were asked if they had ever smoked cigarettes. If they responded "Yes," they were asked if they had ever smoked cigarettes regularly, i.e., every day for at least 30 days.

*Parental rules, supervision, and behavior.* Mothers responded to 12 items reflecting 4 facets of setting rules or supervising children with respect to behaviors that might encourage smoking: (1) engaging in social activities on school nights, (2) associating with older adolescents, (3) being in situations with no adult supervision, and (4) engaging in activities that encourage cigarette use. Separate scores were calculated for each facet, and a total score was summed across all items. The higher the score, the more the parent discouraged the practice. The  $\alpha$  for the overall scale was 0.74.

*Adolescent perceptions of mother as message source.* Research has shown that 3 source

dimensions are important for the source of a message to be effective in changing attitudes and behavior: (1) perceived expertise, (2) perceived trustworthiness, and (3) accessibility.<sup>9</sup> Adolescents rated their mothers on 7 items reflecting these dimensions, with separate scores calculated for each on the basis of the mean of items representing a given dimension. The higher the score, the more positively the adolescent rated the parent on the dimension. The  $\alpha$  coefficients for the 3 items were 0.82, 0.81, and 0.78, respectively.

*Communication style.* Adolescents rated the style their mothers used to communicate with them, on the basis of 29 items representing 8 facets: (1) starting conversations, (2) empathy, (3) being calm and relaxed, (4) use of self-disclosure, (5) clarity of communications, (6) listening skills, (7) being direct, and (8) conflict management. Separate scores were calculated for each dimension on the basis of the mean of items representing the dimension. The higher the score, the more positive the parent was seen on the dimension. The average  $\alpha$  coefficient for the scales was 0.77.

*Communication frequency.* Adolescents responded to 30 items rating how often they had talked with their mothers about different smoking-related topics. Scores were averaged across the items, with higher scores indicating a greater frequency of communication. The  $\alpha$  coefficient was 0.93.

*Social desirability response tendency.* Social desirability response tendencies were assessed with 5 items that generally were not true for anyone but that people trying to create a good impression would assert. Maternal and adolescent scores were independently averaged across items, with higher scores reflecting a greater social desirability response tendency.

**Data Analysis**

The major analyses used either linear regression or logistic regression, depending on the nature of the outcome variable. The treatment condition was dummy-coded such that a code of 1 meant participating in TNT plus the Linking Lives Parenting Program (TNT plus parent) and of zero meant participating only in the TNT program (TNT only). Covariates included maternal marital status, maternal education, and adolescent gender, grade, and

ethnicity. All analyses were repeated with the use of bootstrapping to determine whether conclusions generalized across traditional methods of analysis versus robust methods of analysis; the conclusions were the same. Some developmentalists prefer the use of age instead of grade as markers of developmental status, but all of our conclusions were the same no matter which developmental marker was used as a covariate. Outlier and specification-error diagnostics were examined in all analyses, and no problems were evident in these statistical checks.

**RESULTS**

*Descriptive statistics, randomization checks, and design effects.* Table 1 presents descriptive statistics characterizing the sample. As a check on randomization, baseline mean values (and

**TABLE 1—Descriptive Statistics at Baseline for Total Sample (n = 1096): African American and Latino Mother-Adolescent Dyads, New York, NY, 2004–2007**

Characteristics	Value
<b>Mothers</b>	
Mean age, y	40.1
Modal education, <sup>a</sup> %	24.6
Catholic, %	58.0
Baptist, %	11.0
No religion, %	11.2
Mostly speak Spanish in the home, %	53.7
Latino, %	74.2
African American, %	24.0
Born in the United States, %	32.9
Single head of household, %	46.9
<b>Adolescents<sup>b</sup></b>	
Mean age, y	12.1
Male, %	49.6
Mostly speak Spanish in the home, %	33.4
Born in the United States, %	75.8
Ever smoked cigarettes, %	5.4
Grade 6, %	43.1
Grade 7, %	54.8
Grade 8, %	2.1

<sup>a</sup>Modal education equated to some high school but did not graduate.  
<sup>b</sup>Adolescents were in sixth, seventh, or eighth grade.

percentages for dichotomous outcomes) for the TNT-plus-parent condition and the TNT-only condition were compared for all outcome variables. In no case was a statistically significant difference observed. We therefore focused our analyses on posttest-only mean and percentage differences between the 2 groups. The intraclass correlation for school effects on smoking was trivial (<0.01), and this also was true for other outcome variables. All analyses yielded comparable conclusions irrespective of whether schools were included as a (random effects) covariate to control for clustering.

**Attrition and attrition bias.** Of the dyads who were interviewed at baseline, 22% were not

located for the final interview or did not participate in it. Attrition did not significantly vary by condition (23% in the TNT-plus-parent condition vs 22% in the TNT-only condition), nor was attrition associated with any of the demographic variables or outcome variables measured at baseline.

**Intervention contamination.** Because the TNT-plus-parent and the TNT-only programs were administered within the same schools, we tested for contamination effects by assessing whether materials distributed to mothers in the TNT-plus-parent condition had somehow found their way into the hands of mothers in the TNT-only condition. For the parents and

adolescents in the TNT-only condition, 25% stated that they had given their child a handout that had been distributed solely to parents in the TNT-plus-parent condition. This represented a higher level of contamination than we had anticipated, and it worked against finding an effect for the TNT-plus-parent condition relative to the TNT-only condition, because a quarter of the TNT-only parents had access to some TNT-plus-parent materials.

**Social desirability response bias.** There was a weak but statistically significant correlation between social desirability response tendencies and self-reports of having smoked cigarettes, such that those scoring higher on the social

**TABLE 2—Unstandardized Regression Coefficients and Odds Ratios for Selected Outcome Variables as Predicted From Type of Treatment and Covariates: African American and Latino Mother-Adolescent Dyads, New York, NY, 2004–2007**

Outcome	Experimental Condition, <sup>a</sup> OR (95% CI)	Maternal Education <sup>b</sup>	Maternal Marital Status <sup>c</sup>	Social Desirability	Adolescent Age at Baseline	Adolescent Gender	Adolescent Ethnicity <sup>d</sup>
<b>Parental expectations<sup>e</sup></b>							
Activities that encourage cigarette use	0.08* (0.02, 0.13)	0.03*	0.00	-0.03*	-0.01	-0.02	0.00
Social activities on school nights	0.07* (0.02, 0.12)	0.01	0.07*	0.01	-0.02	-0.01	0.05
Associating with older peers	0.06* (0.01, 0.12)	0.00	0.06	0.04*	-0.02	-0.02	0.13*
Engaging in activities without adult supervision	0.01 (-0.05, 0.07)	0.04*	0.09*	0.03*	-0.02	0.00	0.03
General	0.05* (0.01, 0.09)	0.02*	0.05*	0.01	-0.02	-0.02	0.05*
<b>Parent as a message source<sup>f</sup></b>							
Expertise	0.08 (-0.05, 0.20)	0.02	0.07	0.20*	-0.13*	0.13*	-0.03
Trustworthiness	0.16* (0.06, 0.26)	0.02	0.09	0.15*	-0.10*	0.03	0.02
Accessibility	0.03 (-0.07, 0.12)	0.02	0.02	0.01	-0.06*	-0.01	-0.11
<b>Communication style<sup>g</sup></b>							
Getting started	0.20* (0.04, 0.35)	-0.01	0.06	0.08*	-0.04	-0.08	-0.26*
Empathy	0.14* (0.02, 0.26)	0.02	0.10	0.20*	-0.10*	0.06	-0.03
Being relaxed	0.10* (0.03, 0.17)	0.01	0.05	0.07*	-0.04*	-0.01	-0.08
Self-disclosure	0.11* (0.01, 0.21)	0.00	0.05	0.08*	-0.05	-0.16*	-0.03
Clarity	0.17* (0.05, 0.28)	0.00	0.10	0.21*	-0.04	0.06	-0.09
Listening	0.16* (0.05, 0.27)	0.02	0.11	0.25*	-0.11*	0.01	0.00
Being direct	0.08 (-0.03, 0.19)	0.02	0.04	0.20*	-0.11*	0.02	-0.04
Conflict management	0.09 (-0.01, 0.19)	-0.02	0.08	0.18*	-0.08*	-0.04	-0.02
Frequency	0.38* (0.23, 0.52)	-0.03	-0.05	0.28*	-0.11*	0.06	0.22
Adolescent smoking behavior <sup>h</sup> : Ever smoked <sup>i</sup>	0.58* (0.36, 0.94)	1.03	0.58	0.78*	1.63*	0.65	0.70

Note. OR=odds ratio; CI=confidence interval. Adolescents were in sixth, seventh, or eighth grade; n=1096.

<sup>a</sup>Coded as 1 (TNT plus parent) or 0 (TNT only).

<sup>b</sup>Scored 1–6.

<sup>c</sup>Coded as 1 (married) or 0 (not married).

<sup>d</sup>Coded as 1 (Latino) or 0 (not Latino).

<sup>e</sup>Scored 1–5.

<sup>f</sup>Scored 1–5.

<sup>g</sup>Scored 1–5.

<sup>h</sup>Coded as 1 (yes) or 0 (no).

<sup>i</sup>Logistic regression analysis. Entries are exponents of coefficients (ORs).

\*P<.05.

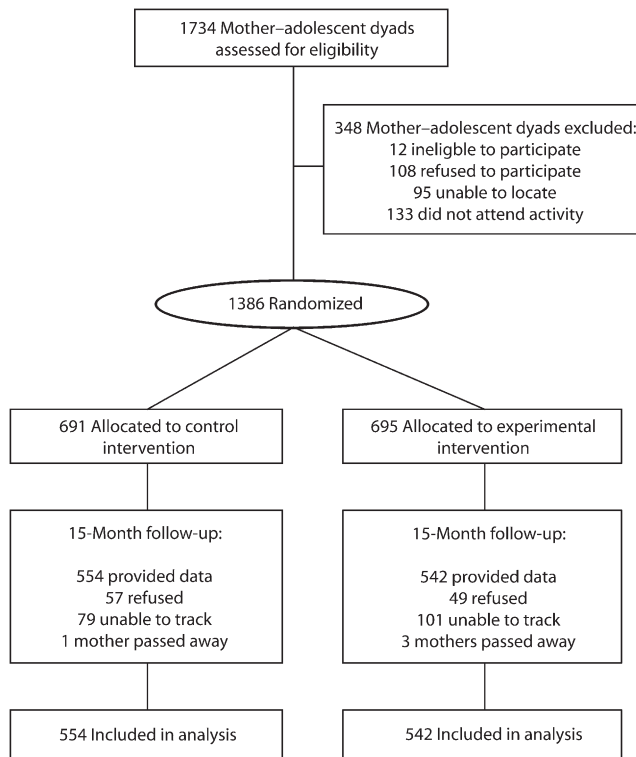


FIGURE 1—Flow chart of study participants.

desirability response scale were less likely to report having smoked cigarettes ( $r = -0.07$ ;  $P < .05$ ). For this reason, the adolescent social desirability measure was included in all analyses in which an adolescent outcome was used. The maternal social desirability measure was used as a covariate for all maternal outcomes.

**Use of the TNT-plus-parent materials.** Of the mothers in the TNT-plus-parent condition, 67% stated that they had given the booklet to their adolescent. At the 15-month postintervention assessment, 80% of the mothers reported having read at least some of the Linking Lives materials, and 65% said they had given their child the “homework” story to read. Thus, a substantial portion of the mothers in the TNT-plus-parent condition took advantage of the distributed materials.

**Effect of Parent Add-on Component**

**Parental expectations and behavior.** Separate regressions were performed on outcome variables about parents setting rules and limits; the results are shown in Table 2. Mothers in the

TNT-plus-parent condition were more likely than were mothers in the TNT-only condition to set limits and rules about (1) not engaging in behaviors that might encourage smoking, (2) engaging in social activities on school nights, and (3) associating with older peers.

**Adolescent perceptions of parent as message source.** Adolescents in the TNT-plus-parent condition were more likely to see their mothers as being trustworthy than were adolescents in the TNT-only condition, as measured across the 3 source dimensions of perceived expertise, trustworthiness, and accessibility.

**Communication style.** Adolescents in the TNT-plus-parent condition were more likely than were adolescents in the TNT-only condition to report that their mothers could more easily get conversations started, were empathic, were calm and relaxed during conversations, were likely to use self-disclosure, were clear in presentations of their arguments and logic, and were good listeners.

**Frequency of communication about not smoking cigarettes.** Adolescents in the

TNT-plus-parent condition reported statistically significant more frequent communication with their mothers about topics related to not smoking cigarettes than did adolescents in the TNT-only condition.

**Smoking behavior.** A logistic regression analysis was conducted on whether the adolescent had ever smoked cigarettes, the results of which are reported in Table 2. The odds of smoking for the TNT-plus-parent condition were lower than the odds of smoking in the TNT-only condition by more than 40%.

**Additional Perspectives on Adolescent Smoking Behavior**

Additional perspectives on the effects of the interventions on smoking behavior become evident when simple percentages are examined. At baseline, 5% of adolescents had smoked cigarettes at some time in their life (3.4% for sixth graders; 6.3% for seventh graders). At the 15-month follow-up, 10% of the adolescents in the TNT-only condition reported having smoked cigarettes at some time in their life, whereas the corresponding percentage remained at 5% in the TNT-plus-parent condition. Although this study did not include a no-intervention control group, a year prior to this study we collected data on lifetime smoking rates for 413 seventh- and eighth-graders in a subset of the schools from this study. If those data are weighted to conform to the proportion of seventh- and eighth-graders at the 15-month follow-up in the present study, the percentage of adolescents who reported that they had smoked cigarettes at some time in their life was 19%. Although not definitive, these data suggest that the effects of both the TNT-only condition and the TNT-plus-parent condition relative to a “standard care” condition are meaningful. The effect of the TNT-plus-parent intervention relative to the TNT-only condition did not statistically significantly vary as a function of grade level (sixth vs seventh) or of the gender of the adolescent at baseline.

**DISCUSSION**

Parent-based adolescent tobacco interventions have recently been the subject of increased interest, and several studies have reported findings that suggest the effectiveness of such interventions. However, no

studies have found that adding a parental component to a preexisting effective tobacco program affects adolescent smoking relative to using that program by itself.<sup>20</sup> Such tests of parent programs are stringent because they demand that the parent add-on component affect the type of youth whom the stand-alone program is unable to affect, namely difficult-to-change youths.

In our study, we developed a parental add-on component as part of the broader Linking Lives Health Education Program and tested its incremental effects relative to a modified version of Project TNT.<sup>25</sup> We found that, relative to the modified TNT-only program, the modified TNT-plus-parent program (1) increased mothers' tendency to set limits and rules about adolescent behaviors that might encourage smoking, (2) increased adolescents' ratings of their mothers' trustworthiness, (3) increased how frequently parents talked with their children about not smoking, and (4) increased adolescents' ratings of the quality of communication with their mothers, including ease of getting conversations started, maternal use of self-disclosure, clarity of arguments, listening skills, empathy, and remaining calm and relaxed. All of these parenting facets were addressed in the intervention.

More importantly, the parental add-on reduced smoking behavior by more than 40% relative to the modified TNT stand-alone program. This result is further supported by the higher-than-expected contamination reported by families in the TNT-only condition. Given that almost a quarter of the TNT-only condition had access to some of the TNT-plus-parent materials, the likelihood of finding an effect for the TNT-plus-parent condition relative to the TNT-only condition was diminished. Taken together, these data suggest the promise of the Linking Lives parent intervention.

It is significant that the program showed effectiveness with African American and Latino inner-city youths, as both groups are vulnerable to the negative consequences associated with tobacco use.<sup>3,4</sup> The vast majority of parent-based tobacco reduction programs have focused on White middle-class youths. Thus, the program's effectiveness with African American and Latino adolescents is that much more important.

A useful feature of the interventions in this study is that they are practical and plausible

for resource-poor inner-city schools. Such schools often cannot commit extensive class time to health interventions, even within required health classes, where perspectives on smoking constitute but one of many topics that must be covered. Although we had to adapt the traditional TNT program to make it more compatible with resource-poor school environments, our data suggest that the modified program was still effective, and particularly so when paired with a parent add-on component.

We believe that the Linking Lives parent add-on program was effective because it was based on strong theories of adolescent behavior (e.g., theory of reasoned action, health belief model, social learning theory, self-regulation theories, and the theory of subjective culture<sup>26,27</sup>) and strong theories of parenting,<sup>28,29</sup> while being developmentally appropriate for middle-school youths. Another strength of the program was the tailoring of intervention materials and content to the ethnicities of parents and adolescents, making it culturally relevant to the target populations. Specifically, our formative research identified the core expectancies, normative influences, attitudes, emotions, and prototypes of smokers from the target populations. This information was integrated into the Raising Smoke-Free Kids intervention. Finally, the program included material relevant to inner-city settings, making it easier for adolescents and parents to identify with its focus and participate in the program.

Despite the promising results of this study, its limitations caution against overinterpreting the data and should be kept in mind. First, smoking behavior of adolescents was based on self-reports, which may be biased. Second, the measures in the study are subject to measurement error, and such error can bias parameter estimates. Third, the study did not include a formal, randomized, "no intervention" control group, so any statements about the absolute effectiveness of the interventions must be approached tentatively. Fourth, the extent to which the results will generalize to other populations is unclear. Despite these shortcomings, the results of the present study are encouraging and suggest that further research on programs that integrate prevention education for both parents and youths is warranted. ■

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### Contributors

V. Guilamo-Ramos and J. Jaccard were the principal investigators for the study in the article. V. Guilamo-Ramos, J. Jaccard, P. Dittus, and S. Banspach conceptualized and designed the study. V. Guilamo-Ramos and B. Gonzalez acquired the data. V. Guilamo-Ramos and J. Jaccard analyzed and interpreted the data. V. Guilamo-Ramos, J. Jaccard, and A. Bouris participated in drafting the article. All authors participated in critical revision of the article.

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### Human Participant Protection

This research was approved by institutional review boards at Columbia University and the CDC.

### References

- Centers for Disease Control and Prevention. Tobacco use and the health of young people. Available at: [http://www.cdc.gov/HealthyYouth/tobacco/pdf/tobacco\\_factsheet.pdf](http://www.cdc.gov/HealthyYouth/tobacco/pdf/tobacco_factsheet.pdf). Accessed April 30, 2010.
- Centers for Disease Control and Prevention. Smoking-attributable mortality and years of potential life lost—United States, 1984. [Perspectives in Disease Prevention and Health Promotion.] *MMWR Morb Mortal Wkly Rep*. 2000;46(20):444–451.
- Moolchan ET, Fagan P, Fernander AF, et al. Addressing tobacco-related health disparities. *Addiction*. 2007;102(suppl 2):30–42.
- US Dept of Health and Human Services. *Tobacco Use Among US Racial/Ethnic Minority Groups: African Americans, American Indians and Alaska Natives, Asian Americans and Pacific Islanders, and Hispanics: A Report of the Surgeon General*. Atlanta, GA: US Dept of Health and Human Services, Centers for Disease Control and Prevention, National Center for Chronic Disease Prevention and Health Promotion, Office on Smoking and Health; 1998.
- Brook JS, Pahl K, Ning Y. Peer and parental influences on longitudinal trajectories of smoking among

- African Americans and Puerto Ricans. *Nicotine Tob Res.* 2006;8(5):639–651.
6. Gritz ER, Prokhorov AV, Hudmon KS, et al. Predictors of susceptibility to smoking and ever smoking: a longitudinal study in a triethnic sample of adolescents. *Nicotine Tob Res.* 2003;5(4):493–506.
  7. Guilamo-Ramos V, Bouris A, Dittus P, Jaccard J. Mother–adolescent communication about tobacco use in urban Puerto Rican and Dominican families. *Youth Soc.* 2008;40(1):86–113.
  8. Livaudais JC, Napoles-Springer A, Stewart S, Kaplan CP. Understanding Latino adolescent risk behaviors: parental and peer influences. *Ethn Dis.* 2007;17(2):298–304.
  9. Guilamo-Ramos V, Jaccard J, Dittus P, Bouris A. Parental expertise, trustworthiness, and accessibility: parent-adolescent communication and adolescent risk behavior. *J Marriage Fam.* 2006;68(5):1229–1246.
  10. Clark PI, Scarisbrick-Hauser A, Gautam SP, Wirk SJ. Anti-tobacco socialization in homes of African American and White parents, smoking and nonsmoking parents. *J Adolesc Health.* 1999;24(5):329–339.
  11. Koepke D, Flay BR, Johnson CA. Health behaviors in minority families: the case of cigarette smoking. *Fam Community Health.* 1990;13(1):35–43.
  12. Kandel DB, Kiros GE, Schaffran C, Hu MC. Racial/ethnic differences in cigarette smoking initiation and progression to daily smoking: a multilevel analysis. *Am J Public Health.* 2004;94(1):128–135.
  13. Resnick MD, Bearman PS, Blum RW, et al. Protecting adolescents from harm. Findings from the National Longitudinal Study of Adolescent Health. *JAMA.* 1997;278(10):823–832.
  14. Simons-Morton B, Haynie DL, Crump AD, Eitel P, Saylor KE. Peer and parent influences on smoking and drinking among early adolescents. *Health Educ Behav.* 2001;28(1):95–107.
  15. Bauman KE, Foshee VA, Ennett ST, et al. The influence of a family program on adolescent tobacco and alcohol use. *Am J Public Health.* 2001;91(4):604–610.
  16. Biglan A, Glasgow RE, Ary DV, et al. How generalizable are the effects of smoking prevention programs? Refusal skills training and parent messages in a teacher-administered program. *J Behav Med.* 1987;10(6):613–628.
  17. Elder JP, Litrownik AJ, Slymen DJ, et al. Tobacco and alcohol use-prevention program for Hispanic migrant adolescents. *Am J Prev Med.* 2002;23(4):269–275.
  18. Prado G, Pantin H, Briones E, et al. A randomized controlled trial of a parent-centered intervention in preventing substance use and HIV risk behaviors in Hispanic adolescents. *J Consult Clin Psychol.* 2007;75(6):914–926.
  19. Wu Y, Stanton BF, Galbraith J, Kaljee L, Cottrell L, Li X. Sustaining and broadening intervention impact: a longitudinal randomized trial of 3 adolescent risk reduction approaches. *Pediatrics.* 2003;111(1):e32–e36.
  20. Thomas RE, Baker P, Lorenzetti D. Family-based programmes for preventing smoking by children and adolescents. *Cochrane Database Syst Rev.* 2007;(1):CD004493. doi:10.1002/14651858.CD004493.pub2.
  21. Guilamo-Ramos V, Dittus P, Holloway I, Bouris A, Crossett L. An integrated framework for adolescent cigarette smoking in middle school Latino youth. *Youth Soc.* 2:1–32.
  22. Sussman S, Dent CW, Burton D, Stacy AW, Flay BR. *Developing School-Based Tobacco Use Prevention and Cessation Programs.* Thousand Oaks, CA: Sage Publications; 1995.
  23. Sussman S, Dent CW, Stacy AW, et al. Project Towards No Tobacco Use: 1-year behavior outcomes. *Am J Public Health.* 1993;83(9):1245–1250.
  24. Dent CW, Sussman S, Stacy AW, et al. Two-year behavior outcomes of Project Towards No Tobacco Use. *J Consult Clin Psychol.* 1995;63(4):676–677.
  25. Marin G, Van Oss Marin B. *Research with Hispanic Populations.* Thousand Oaks, CA: Sage Publications; 1991.
  26. Guilamo-Ramos V, Jaccard J, Dittus P, Bouris A, Holloway I, Casillas E. Adolescent expectancies, parent-adolescent communication, and intentions to have sexual intercourse among inner city, middle school youth. *Ann Behav Med.* 2007;34(1):56–66.
  27. Guilamo-Ramos V, Jaccard J, Dittus P, Gonzalez B, Bouris A. A conceptual framework for the analysis of risk and problem behaviors: the case of adolescent sexual behavior. *Soc Work Res.* 2008;32(1):29–45.
  28. Guilamo-Ramos V, Dittus P, Jaccard J, et al. Parenting practices among Dominican and Puerto Rican mothers. *Soc Work.* 2007;52(1):17–30.
  29. Guilamo-Ramos V, Jaccard J, Dittus P, Collins S. Parent-adolescent communication about sexual intercourse: an analysis of maternal reluctance to communicate. *Health Psychol.* 2008;27(6):760–769.