The increasing incidence of human immunodeficiency virus (HIV) infection among youth and young adults has created a heightened need to improve our understanding of factors influencing sexual risk-taking behaviors and to design effective prevention programs. Two psychological theories of behavior frequently applied in studies examining predictors of intentions to use condoms and actual condom use are social cognitive theory (SCT) [1] and the theory of reasoned action (TRA) [2] with its extension, the theory of planned behavior (TPB) [3]. These theoretical models also have served as a basis for a number of HIV prevention efforts directed toward adolescents [4-10]. Support for these behavioral prediction models has been provided by studies involving general populations of adolescents and adults attending mainstream schools and colleges, sexually transmitted disease (STD) clinics, or who are homeless, and those accessible through household surveys [4-15]. The samples in many past investigations were composed predominantly of African-American youth [6,8,14,15].
Despite the growing number of HIV prevention studies involving youth, a very limited number of studies have been conducted with samples of pregnant and parenting adolescents (referred to in this article as adolescent mothers) on predictors of sexual risk behaviors or the effectiveness of interventions designed to decrease their risk for HIV [16–20]. Findings from these studies revealed that young mothers have basic knowledge and some personal concern about HIV, but also hold common misconceptions about HIV and people living with acquired immune deficiency syndrome (AIDS) [16,18]. Personal concern about HIV has been observed to be associated significantly with consistency of condom use [16]. In focus group discussions, Latina adolescent mothers expressed beliefs that cultural taboos against condom use in primary relationships affect sexual risk taking [16]. Furthermore, young mothers often believed (or wanted to believe) that they were in a monogamous steady relationship with a trusted partner and, therefore, were protected against HIV/AIDS; thus, they may have failed to take into account the previous or concurrent sexual activity of their partner or other partner risk factors such as injection drug use. These beliefs are likely to contribute to their failure to use or inconsistent use of condoms [19]. Koniak-Griffin and Brecht [20] found that engagement in unprotected sex by adolescent mothers of predominantly minority backgrounds was predicted significantly only by pregnancy status. Pregnant adolescents were more likely than young mothers not currently pregnant to have unprotected sex. Furthermore, current pregnancy status, history of marijuana use, and ethnicity were strong predictors of having had multiple sex partners.

In this article, we examined the following: (1) whether an HIV-prevention program for adolescent mothers based on concepts from SCT and TRA generates positive change in measures of related theoretical constructs (self-efficacy, outcome expectancies, subjective norms, and perceived behavioral control); and (2) the effects of these theoretical constructs, as well as past sexual behaviors, on adolescent mothers’ intentions to use condoms, and on their sexual risk behaviors (unprotected sex, multiple sex partners) after the intervention.

Adolescent mothers represent a high-risk population for HIV exposure through heterosexual transmission for several reasons. Predominantly from vulnerable ethnic/racial minority groups disproportionately affected by HIV (e.g., Latinos, with the highest teenage birthrates in the nation [21]), they have a history of early onset of sexual activity, and use protective measures against STDs inconsistently or not at all. Many report having more than one sexual partner and have experienced physical and/or sexual abuse [22,23].

SCT proposes 2 important influences as primary determinants that underlie the initiation and persistence of an adaptive behavior such as use of condoms to prevent HIV/AIDS. First, individuals must have perceived self-efficacy with regard to the behavior. That is, they must hold a strong belief in their own capability to perform the specific behavior in question successfully under a number of circumstances [1]. Perceived self-efficacy is a mediating factor between knowledge and behavior. Second, these individuals must have the outcome expectancy that a given behavior is likely to lead to positive rather than negative outcomes. A person who expects a behavior to be successful will continue to engage in it, even when progress toward such success is challenging. Outcome expectancy beliefs that relate specifically to condom use include positive and negative prevention beliefs (e.g., “Condoms will/will not protect me from HIV infection”), hedonistic beliefs (e.g., “Sex can/cannot be fun using a condom”), and partner reaction beliefs (e.g., “My partner will/will not agree to use condoms”). Another significant determinant of behavior in SCT is the person’s perception of peer norms.

According to the TRA, performance of a behavior is determined by the strength of a person’s intention to perform that behavior [2]. Two conceptually distinct sets of beliefs affect behavior intention: (1) behavioral beliefs influence the individual’s attitude toward performing a behavior, and (2) normative beliefs influence subjective norms (i.e., what the individual thinks the people important to him/her believe and want him/her to do regarding the behavior). Thus, a person who believes that use of condoms will lead to positive outcomes and/or prevent negative outcomes is more likely to have a positive attitude toward using condoms. The TRA identifies attitudes and subjective norms as independent predictors of intentions. In most studies, intention is influenced by attitudes to a greater extent than by subjective norms [24].

A major assumption in TRA is that intention is an accurate predictor of behavior only when the person can perform the behavior at volition. To take into consideration the limitations in performing a given behavior, real or perceived, Ajzen added a third component, perceived behavioral control, to the original TRA model [2]. This construct reflects the individual’s belief about how easy or difficult adopting a behavior is likely to be, and may reflect external and internal factors such as dependence on others for social support and resources (e.g., information, skills). The TPB proposes that perceived behavioral control has both an indirect effect, through behavioral intentions, and a direct effect on behavior [3].

A growing body of theoretical research has been undertaken to increase understanding of factors influencing behavioral intentions and risky sexual behaviors, yet the interpretation of results from many past studies is weakened because of methodologic limitations. Data frequently are collected in cross-sectional surveys at one time point only; therefore, although correlations can be identified, the direction of causation is not implicit in the data (i.e., whether one variable actually predicts another only can be inferred). Furthermore, when intention and behavior are measured at the same time, random error can inflate correlations artifi-
cially, and participants may alter their responses to questions to appear consistent [25].

A related concern is the attempt to predict the relationship between the dependent (outcome) variable, sexual behavior during some past time interval, and several psychosocial constructs measured after the behavior has occurred. In many studies, past sexual behaviors are not considered as a variable that may be linked to future behavior and intentions, even though research findings show that past actions have a direct influence on future behavior [25,26]. Despite these limitations, findings from several studies and meta-analyses provide important information about associations among various psychosocial variables, behavioral intentions, and actual sexual behaviors, particularly condom use. Few investigators, however, have examined correlates of multiple sex partners.

A recent investigation of predictors of sexual intercourse and condom use intention among Spanish-dominant low-acclimated Latino youth was conducted by Villarruel et al [27]. Findings revealed that attitudes, subjective norms, self-efficacy, partner and parental approval, and impulse control beliefs were significant predictors of intentions to use condoms among the 12- to 18-year-old participants, the majority of whom were not sexually active at baseline. Attitudes and normative beliefs were predictive of sexual intercourse behavior.

Albarracin et al examined predictors of condom use in a sample of African-American and mixed ethnic identity adults [28]. By using items in a knowledge, attitude, belief, and practice survey as indicators of theoretical variables, they found frequency of past condom use to be related significantly to behavioral norms and perceived control but not to individual outcome beliefs. The influence of past behavior was mediated partially by its effect on attitudes and norms. In a sample of youth living in housing developments, prospective analyses identified baseline level of condom use as the best predictor of condom use at the 6-month follow-up evaluation [14].

Research findings on the relationship between self-efficacy and sexual risk behaviors are mixed. Several studies have found moderate to strong associations between these variables, with lower self-efficacy in adolescents related to engaging in high-risk sexual practices [14,15,29]. In contrast, other investigators report less powerful relationships among self-efficacy, intentions, and condom-use behavior, particularly after controlling for other measures such as attitude and subjective norms [30]. Findings from a longitudinal study do not support the hypothesis that condom use self-efficacy predicts condom use behavior change, although cross-sectional correlations between self-efficacy and behavior were reported [12]. In a meta-analysis of 121 studies, Sheeran et al [31] attempted to determine which variables were correlated most strongly with heterosexual condom use. The average correlation between behavioral intention and condom use was high \( r = .46 \), consistent with earlier research cited in their report. Perceived barriers and beliefs concerning condom attractiveness, interpersonal consequences of condom use, embarrassment associated with purchase of condoms, and self-efficacy had small effect sizes that were, nonetheless, statistically reliable and in the predicted direction. The average correlation for subjective norms was .26, indicating that greater perceived pressure was associated moderately with condom use. Other variables that had small-to-negligible associations with condom use in the overall analysis included knowledge of HIV/AIDS and the number of sexual partners.

Findings from another meta-analysis based on 96 synthesized datasets from 42 reports that tested the TRA, the TPB, or both, provided further support for the relationship between condom use and intentions (weighted mean \( r = .45 \) and the influence of attitudes and subjective norms on intentions \( r = .58 \) and .39, respectively) [25]. Studies assessing condom use retrospectively, rather than prospectively, had somewhat larger intention-behavior associations, supporting the belief that people base their intentions (and attitudes) on their past behaviors. Perceived behavioral control was related to intention (\( r = .45 \)) and condom use (\( r = .25 \)); however, its effect on condom use was not significant.

A comprehensive review of a wide range of theory-based behavioral interventions to decrease incidence of HIV, other STDs, and pregnancy among adolescents was performed by Robin et al [32]. Their findings, based on a decade of research (primarily randomized clinical trials), suggest that 4 main factors impact program effectiveness: focus on skills that decrease specific sexual risk behaviors, program duration and intensity, careful determination by researchers and health educators on what constitutes an entire program, and training of program facilitators.

One of the very few HIV prevention studies involving a small number of pregnant adolescents (along with a larger sample of adult women) was conducted by Hobfoll et al [17]. Participants in the 4-session (experimental condition) AIDS-prevention intervention showed consistent increases in knowledge and condom use compared with those in the equivalent health-promotion intervention. However, no group differences were found for number of sex partners or abstinence behaviors.

**Materials and Methods**

**The Children’s Health and Responsible Mothering project**

The data reported here were collected as part of a longitudinal clinical trial examining the effects of the Children’s Health and Responsible Mothering (CHARM) project, an HIV-prevention program for economically disadvantaged, predominantly Latina adolescent mothers [33].
Adolescents receiving the HIV intervention showed significant improvements in AIDS knowledge and intentions to use condoms, and fewer sex partners at the 6-month follow-up evaluation as compared with those in the control group, who received a comparable-length health-promotion program. There were, however, significant decreases in self-reported unprotected sex episodes after the intervention in both groups. Immediately after the intervention (posttest), adolescent mothers in the HIV-prevention program scored significantly higher on the self-efficacy measure than those in the control group. Participants in both groups showed significant improvements from baseline to the posttest on the measures of prevention beliefs, partner reaction beliefs, and behavioral control. Furthermore, an analysis of baseline measures of theoretical variables and contextual factors (clinical, psychosocial, sociodemographic) revealed that 13% of the variance in the model for factors associated with unprotected sex was accounted for by TRA constructs [19]. Other variables contributed an additional 17% of the variance. Unprotected sex was associated significantly with behavioral intentions to use condoms, pregnancy, having a steady partner, more frequent church service attendance, and ever having anal sex. Findings from this study were limited because data analyzed were from a single time period; therefore, the impact of past actions and current attitudes on future behavior could not be measured directly.

In the present study we used a prospective design with a latent variable approach to address 2 research questions. First, we assessed whether pregnant and parenting adolescents who received an HIV-prevention program reported significantly greater perceived self-efficacy and perceived behavioral control to use condoms, and more favorable outcome expectancies and subjective norms regarding condom use at 3 months after intervention, than those assigned to a control group (aim 1). Based on our earlier findings, it was hypothesized that adolescents in the HIV-prevention group would show a significantly greater increase in scores for these theoretical variables, from the pretest to the 3-month follow-up evaluation, than those in the control group. We also expected that both groups would show some improvement. Second, we assessed the impact of the improved postintervention theoretical variables targeted by the HIV-prevention program (perceived self-efficacy, outcome expectancies, subjective norms, and perceived behavioral control) on concurrent intentions to use condoms, and on subsequent sexual risk behaviors (multiple sex partners and unprotected sex) at 6 months after the intervention (aim 2). It was hypothesized that adolescent mothers with higher scores on the cognitive variables would report greater intentions to use condoms at the 3-month follow-up evaluation, and that intentions would serve as a mediator between the cognitive variables and the behavioral outcomes.

**Methods**

**Recruitment and participants**

Four school districts in Los Angeles County participated in Project CHARM. Alternative schools with pregnant minor or young parents’ programs were assigned randomly to the experimental (HIV-prevention program) or control (health-promotion program) condition for a period of 1 year. Because student enrollment at each school’s pregnant minor/parenting program was limited to a year or less, it was possible to alternate the presentation of the HIV program with the control program annually at each site over the 3-year study period, allowing a complete cross-over design, thus minimizing the threat of any influence on the outcomes of pre-existing differences between the schools. The use of this procedure, rather than participant random assignment, also minimized the threat of contamination among students within school sites. The HIV intervention and control conditions offered were comparable in length and facilitated by specially trained nurses or health educators.

All recruitment procedures, study protocols, and written questionnaires were approved by the University’s Institutional Review Board and the administrators of the participating schools. Parental consent was waived; nevertheless, recruiters encouraged young women to inform their parents about their involvement in the project. Adolescents were informed that study participation was voluntary and that, on completion of each set of questionnaires, they would receive $15 as partial compensation for their time. They also received $10 per class attended and, on completion of the study, a charm with the birthstone of their baby. Adolescents in both groups completed written questionnaires before and immediately after the intervention, and at 3- and 6-month follow-up evaluations. Questionnaires were read to small groups of young women by specially trained research staff blinded to experimental conditions. Completion of the questionnaires took approximately 45 to 90 minutes.

The original sample included 572 pregnant adolescents and young mothers. We report on the 87% \((n = 496)\) who provided data at all 5 time points, although only a subset of these time points is used in the current study. Comparison of adolescents retained in the study with those who dropped out revealed no significant differences in most sociodemographic characteristics (e.g., age, ethnicity, pregnancy status) or in reported sexual risk behaviors.

**Table 1** shows the characteristics of participants. The large majority of participants were Latina with a moderately high level of acculturation and lower socioeconomic status (Hollingshead 4-factor = 30.36, SD = 10.62). The groups were nearly equivalent in sociodemographics. Both groups were composed largely of unmarried young women living in poverty and of minority ethnicity (Latinas, 78%; African-Americans, 18%). The large majority (72%) of participants were 16 to 18 years of age; 27% were 15 years old or younger. At baseline most (88%) were in a steady relation-
ship, generally with the father of the baby. A significantly greater number of adolescents in the HIV-prevention program (70%) were pregnant at baseline compared with those in the control group (58%) \( (\chi^2 = 6.34, p < .01) \). Because of power requirements of an unrelated aim in the original study, there were more participants enrolled in the experimental group than the control group.

**Treatment groups**

The HIV-prevention program (CHARM I) for the experimental group \( (n = 346) \) was a modified form of Be Proud! Be Responsible! [34]. The curriculum was renamed “Be Proud! Be Responsible! Be Protective!” to reflect the additional focus on maternal protectiveness as an impetus to decrease or eliminate sexual risk-taking behaviors. New information addressed the impact of HIV/AIDS on pregnant women and their children, prevention of the disease during pregnancy and the postpartum period, and special concerns of young mothers that might influence sexual risk taking. The program emphasized the following: (1) the role of maternal protectiveness in motivating adolescents to make healthy sexual decisions and decrease risky sexual behavior; (2) taking on sexual responsibility and accountability; and (3) political awareness of the effects of HIV/AIDS on inner-city communities and their children. The four 2-hour sessions were designed to be interactive, using culturally and developmentally relevant videotapes, skill-building activities, and role-playing to reinforce learning and encourage active participation. The curriculum included a young mother living with HIV sharing her story and describing how having the AIDS virus affected her life as a mother and the lives of her family members. Her presentation was designed to increase participants’ knowledge about people living with HIV and to enhance their perceptions of personal vulnerability.

The health-promotion program (CHARM II) provided to the control group \( (n = 150) \) consisted of four 2-hour classes, led by a specially trained nurse facilitator who was not involved with the experimental group. Themes included life planning and parenting, communication, handling emotions, and staying healthy. This curriculum also was designed to be interactive through the use of structured activities, group discussion, viewing of videotapes, and role play.

**Measures**

In this study we used latent variables to represent the constructs of interest. These were derived from multi-item scales designed to represent key elements of social cognitive theory. In some cases there were numerous individual items making up a particular scale. For instance, self-efficacy was assessed with 15 items, far too many to be used individually as indicators of one construct. Therefore, parcels of items were combined randomly but in the same fashion at each time period to make sure that they were comparable across time. Parceling is common in latent variable models [35].

**Social-cognitive constructs**

**Self-efficacy.** The 3 parcels, each composed of 5 individual items, were labeled “self-eff1,” “self-eff2,” and “self-eff3.” Answers to each item ranged from 1 (disagree strongly) to 5 (agree strongly). Sample items: “It is easy for me to have

### Table 1

Baseline characteristics of participants by treatment group

<table>
<thead>
<tr>
<th>Variable</th>
<th>HIV-prevention program (CHARM I) ( (n = 346) )</th>
<th>Health-promotion program (CHARM II) ( (n = 150) )</th>
<th>Total sample ( (N = 496) )</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean age</td>
<td>16.64 (SD = 1.16)</td>
<td>16.74 (SD = 1.04)</td>
<td>16.67 (SD = 1.13)</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Latina</td>
<td>266 (77.8%)</td>
<td>114 (77.6%)</td>
<td>380 (77.7%)</td>
</tr>
<tr>
<td>African-American</td>
<td>60 (17.5%)</td>
<td>29 (19.7%)</td>
<td>89 (18.2%)</td>
</tr>
<tr>
<td>Asian</td>
<td>9 (2.6%)</td>
<td>0</td>
<td>9 (1.8%)</td>
</tr>
<tr>
<td>White</td>
<td>6 (1.8%)</td>
<td>3 (2.0%)</td>
<td>9 (1.8%)</td>
</tr>
<tr>
<td>Other</td>
<td>1 (.3%)</td>
<td>1 (.7%)</td>
<td>2 (.4%)</td>
</tr>
<tr>
<td>Marital status</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>247 (73%)</td>
<td>110 (73%)</td>
<td>357 (73%)</td>
</tr>
<tr>
<td>Married</td>
<td>19 (6%)</td>
<td>6 (4%)</td>
<td>25 (5%)</td>
</tr>
<tr>
<td>Living together</td>
<td>72 (21%)</td>
<td>31 (21%)</td>
<td>103 (21%)</td>
</tr>
<tr>
<td>Mean Hollingshead SES (4-Factor)</td>
<td>30.06 (SD = 10.64)</td>
<td>30.97 (SD = 10.63)</td>
<td>30.36 (SD = 10.62)</td>
</tr>
<tr>
<td>Mean grade level (range, 7–12)</td>
<td>10.43 (SD = 1.14)</td>
<td>10.63 (SD = 1.09)</td>
<td>10.49 (SD = 1.23)</td>
</tr>
<tr>
<td>Mean acculturation (Latinos; range, 1–5)</td>
<td>3.43 (SD = .84)</td>
<td>3.52 (SD = .85)</td>
<td>3.46 (SD = .84)</td>
</tr>
<tr>
<td>Pregnant at baseline</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>241 (70%)</td>
<td>87 (58%)</td>
<td>328 (66%)</td>
</tr>
<tr>
<td>No</td>
<td>105 (30%)</td>
<td>63 (42%)</td>
<td>168 (34%)</td>
</tr>
<tr>
<td>Sexually active, past 3 months</td>
<td>264 (76%)</td>
<td>109 (73%)</td>
<td>373 (75%)</td>
</tr>
<tr>
<td>Steady partner</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>304 (88%)</td>
<td>131 (87%)</td>
<td>435 (88%)</td>
</tr>
<tr>
<td>No</td>
<td>41 (12%)</td>
<td>19 (13%)</td>
<td>60 (12%)</td>
</tr>
</tbody>
</table>

* For some variables, the total sample size may be smaller because of missing data.
condoms with me all of the time,” and “I cannot talk to my partner about using condoms.” Items were reverse-scored where appropriate so that high scores indicated more self-efficacy.

Behavioral control. This scale had 9 items, so 3 parcels were constructed with 3 items each. Responses ranged from 1 (very hard) to 5 (very easy). Sample items: “How easy would it be for you to get your sexual partner to talk to you about birth control, even if he did not want to?” and “How hard or easy would it be for you to use a condom during pregnancy?”

Subjective norms. Three items used for this scale reflected how strongly the participant’s parents (mean scores calculated for mother and father items), friends, or sexual partner would approve or disapprove of using a condom (1 = disapprove strongly, to 5 = approve strongly) and the importance of the opinion of her parents (mean scores for mother and father items), friends, and sexual partner to her (1 = extremely unimportant, to 5 = extremely important). Mean scores of parent, friend, and sexual partner attitudes were used.

Hedonistic beliefs. Four separate items comprised this latent variable. A sample item (1 = disagree strongly, to 5 = agree strongly): “Sex would not feel as good if my partner and I used a condom.” Items were reversed appropriately so that higher scores reflect less risky attitudes.

Prevention beliefs. Three items indicated this latent variable. Items (1 = disagree strongly, to 5 = agree strongly) included “Condoms help prevent pregnancy” and “Condoms help prevent AIDS.”

Partner reaction beliefs. Eight items reflected various partner reaction beliefs. Four parcels of 2 items each were constructed to indicate this latent construct. Typical items: “My sexual partner would be happier if we used a condom,” and “If I ask my partner to use a condom, he will be angry.” Higher scores reflect procondom use attitudes by the partner.

Intentions to use condoms. Five items, scored from 1 (extremely unlikely) to 5 (extremely likely), included such questions as, “How likely is it that you will decide to use a condom if you have sex in the next 3 months?” “How likely is it that you will decide to use a condom if you have sex with your steady partner in the next 3 months?” and “How likely is it that you will decide to use a condom if you have sex with someone other than your steady partner in the next 3 months?”

Outcome variables in the predictive model

Outcome variable items were assessed at 3 and 6 months. Multiple partners was a single item that asked, “During the past 3 months, with how many people did you have sex?” Percent condom use was calculated by using 2 items: (1) “In the past 3 months, how many times did you have vaginal sex?” and (2) “In the past 3 months, how many times did you have vaginal sex without using a condom?”

Sociodemographic variables

For purposes of describing the background characteristics of participants, several sociodemographic items were administered, including a 12-item adapted form of the Cuellar Acculturation Scale [36] and the Hollingshead [37] 4-factor measure of socioeconomic status. The Cuellar Acculturation Scale assesses the extent to which Spanish and English are spoken, preferred, read, and written; the ethnic identification of the respondent and her parents; and generational status in the United States. The Hollingshead [37] measures socioeconomic status based on reported maternal and paternal occupation and education. Individual items measured age, ethnicity, marital status, pregnancy status (currently pregnant/already given birth), educational level, and relationship status (having a steady partner).

Analyses

Because of the numerous multiply determined constructs in the model, structural equation modeling with latent variables was used in the analysis [38]. Latent variables are hypothesized underlying constructs that explain the shared variance or relationships among a number of manifest or indicator variables. They also are considered to be error-free measures of underlying constructs and represent a higher order of abstraction than measured variables.

Goodness-of-fit of the model was assessed with the Satorra-Bentler $\chi^2$, the Robust Comparative Fit Index, and the root mean squared error of approximation (RMSEA) [38]. The Robust Satorra-Bentler $\chi^2$ was used because it is more appropriate when the data depart from multivariate normality. Mardia’s normalized multivariate kurtosis estimate was high ($z$-statistic = 28.35) [38], clearly rejecting multivariate normality. The Robust Comparative Fit Index ranges from 0 to 1 and reflects the improvement in fit of a hypothesized model over a model of complete independence among the measured variables. The Robust Comparative Fit Index adjusts for sample size; values at around .95 or greater are desirable, indicating that the hypothesized model reproduces 95% or more of the covariation in the data [38]. The RMSEA is a measure of lack of fit per degrees of freedom, controlling for sample size, and values less than .06 indicate a relatively good fit between the hypothesized model and the observed data [38].

Confirmatory factor analyses

Preliminary confirmatory factor analyses (CFA) were performed with each latent construct, predicting its hypothesized measured indicators. All latent constructs were correlated without any assumption of precedence among them. This analysis tests the sufficiency of the measurement model and provides associations among the latent variables.
In the analyses testing aim 1, the latent variables from the pretest and 3-month assessments were included. Once the measurement models for these variables were shown to be tenable, latent means analyses tested the impact of the intervention conditions and also mean changes in both groups over time.

Latent variable path analysis

The structural path model tests aim 2, using the same 3-month variables as in aim 1. It consists of the SCT latent variables predicting concurrent intentions to use condoms, which, in turn, predicts the outcome variables. To test this hypothesis, the 3-month postintervention attitude scales based on SCT, TRA, and TPB were used as predictors, and the outcomes were (1) the percentage of unprotected vaginal sex episodes that the mothers reported at 6 months after the intervention, and (2) the number of sex partners reported at 6 months. In addition, the percentage of unprotected sex and multiple partners for the previous 3 months were included as further predictors to control for pre-existing behaviors. Three-month scores were used to take advantage of and factor in the intervention and improvement in attitudes that took place among the adolescent mothers. The time difference of 3 months between assessment of attitudes and the critical follow-up behavior of interest also seemed realistic and reasonable among these sexually active young women. Furthermore, the intentions items (described earlier) were phrased to assess intentions “in the next 3 months.” Intentions to use condoms, also measured at 3 months, was used as a mediating variable and also as a direct predictor of risk behaviors at 6 months. Group membership (experimental vs. control) was included as an additional predictor to assess whether any advantage was shown by membership in the HIV-intervention group. All possible predictive paths initially were included in the model, and nonsignificant paths gradually were dropped until only significant pathways remained. Indirect effects of the predictor variables mediated through the intentions variable were assessed as well, and significant indirect paths are reported later. Supplementary nonhypothesized paths and correlations were not added to these models.

Results

Analysis for aim 1

CFA. Table 2 shows the means and SDs of the measured variables that constitute the 6 latent variables at both time periods. In addition, the factor loadings of the measured variables on the hypothetical latent variables are reported.
Table 3
Tests of latent mean differences and impact of group membership in analysis for aim 1

<table>
<thead>
<tr>
<th></th>
<th>Pretest to 3-month follow-up evaluation</th>
<th>z-score mean differences*</th>
<th>z-score of impact of intervention group†</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-efficacy</td>
<td>6.93</td>
<td>1.25</td>
<td></td>
</tr>
<tr>
<td>Behavioral control</td>
<td>6.09</td>
<td>.35</td>
<td></td>
</tr>
<tr>
<td>Subjective norms</td>
<td>3.68</td>
<td>1.40</td>
<td></td>
</tr>
<tr>
<td>Hedonistic beliefs</td>
<td>9.16</td>
<td>.42</td>
<td></td>
</tr>
<tr>
<td>Prevention beliefs</td>
<td>5.43</td>
<td>.39</td>
<td></td>
</tr>
<tr>
<td>Partner beliefs</td>
<td>3.76</td>
<td>.23</td>
<td></td>
</tr>
</tbody>
</table>

* Positive z-score indicates higher score at 3-month follow-up evaluation, \( p \leq .001 \).  
† Positive z-score indicates membership in intervention group (CHARM 1), \( p \) = Nonsignificant.

All factor loadings are substantial and significant (\( p \leq .001 \)). All fit indices were acceptable in the CFA: \( \chi^2 \) (659, \( N = 496 \)) = 1063.47, comparative fit index (CFI) = .95, RMSEA = .035. Correlated error residuals were allowed between the same variables measured at different times (autocorrelations) but were dropped if they were nonsignificant. No other supplementary correlations were necessary.

Latent means models. Table 3 shows the z-scores of the latent mean differences analyses for pretest to 3 months. Substantial improvement was shown on all critical theoretical variables by both groups between both time periods. All z-scores comparing the latent means at pretest and 3 months were large and significant. Intervention effects were nonsignificant, although all z-scores were in the positive direction, indicating a trend favoring the intervention group.

Analysis for aim 2

Table 4 shows the correlations among all of the components of the latent variable model incorporating the improved 3-month predictors, 6-month sexual behavior outcomes, and the intervention group membership before the mediated predictive model was analyzed. The CFA model had excellent fit statistics (\( \chi^2 = 631.73, 342 \) df; CFI = .96, RMSEA = .04). In addition to the positive and significant associations among the various predictors in the model (see Table 4), it is of particular interest to note the significant negative associations among several of the predictors and the percentage of unprotected sex at the 6-month follow-up evaluation. Subjective norms and hedonistic beliefs were associated substantially with the 6-month outcome, as were intentions to use condoms and prior unprotected behavior at 3 months. Self-efficacy and behavioral control were weakly, although significantly, associated with the outcome; prevention beliefs and partner reaction beliefs were not associated significantly with the outcome. Positive partner beliefs were associated positively with multiple partners, counter to the aims of the study. However, because the predictors were designed to relate mostly to condom use, the general lack of many significant associations with multiple sex partners is not surprising. Intervention group membership was associated with fewer women reporting multiple partners.

Figure 1 shows the final latent variable–mediated predictive model that was tested for aim 2 using the variables reported in Table 4. Associations among the predictors (not presented, to decrease clutter in the figure) are similar to those shown in Table 4. Multiple partners at 6 months were predicted by lower subjective norms and prior multiple partners at 3 months. Also, intervention-group membership was associated significantly with reporting fewer sex partners. A higher percentage of unprotected sex at 6 months was predicted by lower intentions to use condoms at 3 months, multiple partners at 3 months, and more unprotected sex at 3 months. In addition, there were significantly indirect effects mediated through intentions to use condoms. Self-efficacy, subjective norms, and hedonistic beliefs had highly significant indirect effects as did unprotected sex at 3 months (\( p \leq .001 \)). The mediated model fit well: \( \chi^2 = 670.59, 379 \) df; CFI = .96, RMSEA = .04. The \( \chi^2 \) difference between the CFA and more parsimonious–mediated model was nonsignificant, indicating that the mediated model was a viable representation of the associations among the variables of the model.

Discussion

This study provides a test of a theoretical framework (SCT, TRA, and TPB) applied in an HIV-prevention program for adolescent mothers, and of the predictors of condom-use intentions, subsequent unprotected vaginal sex, and multiple sex partners among the young participants in an intervention program tailored to the needs of this at-risk subpopulation. The community-based sample of predominantly Latina and African-American young women, recruited from pregnant minor and parenting programs in alternative schools, represents a vulnerable population at higher risk for contracting HIV than several other groups of youth in school-based and other studies. Our findings related to research question 1 showed that both adolescent mothers receiving the HIV-prevention program and those receiving the health-promotion program had significant improvements from pretest to 3-month follow-up evaluation on the theoretical measures of self-efficacy, subjective norms, outcome expectancies, and behavioral control derived from SCT, TRA, and TPB. Although significant group differences in these outcome measures were not found, a slight trend in favor of the intervention group was observed at the 3-month follow-up evaluation.

For research question 2, the results of the mediated predictive model support relationships among several constructs from SCT, TRA, and TPB, intentions to use condoms, and subsequent sexual risk behaviors. Participation in the HIV-prevention program also was associated with re-
porting fewer sex partners at the 6-month follow-up evaluation; however, the data indicate no significant group differences for unprotected vaginal intercourse. Intentions to use condoms was a direct predictor of more condom use behavior; adolescent mothers with higher intentions to use condoms at the 3-month evaluation reported less unprotected sex at the 6-month follow-up evaluation. These intentions to use condoms appear to be influenced in turn by subjective norms, self-efficacy, hedonistic beliefs, and ongoing condom use behaviors. The latent variable of subjective norms was the strongest predictor of intentions to use condoms, but had no further direct influence on future condom use once its association with intentions was included in the predictive model. Additionally, adolescents with more positive feelings about sexual pleasure with condoms and self-efficacy were more likely to have favorable intentions to use condoms.

Past sexual behaviors at the 3-month assessment significantly predicted the same behaviors at the 6-month assessment. The regression coefficient for multiple sex partners was stronger \( r = .43 \) than the correlation observed for percent of unprotected sex \( r = .18 \). Engagement in unprotected sex in the past also had an indirect effect on future condom use through its impact on intentions to use condoms. Having reported multiple sex partners at the 3-month assessment also was found to relate positively to engaging in unprotected sex at the 6-month assessment. The medium correlation between multiple sex partners and unprotected sex is in contrast to the findings of Sheeran et al [31].

Overall, the strength of our model in predicting sexual risk behaviors falls within the lower end of the range reported by Abraham et al [39] in their review of social cognitive models in the literature. They found that, on average, social cognitive models, including SCT, TRA, and TPB, explained 20% to 45% of variance in behavior and were successful in predicting sexual behaviors. Our model explains about 20% of the variance in each outcome variable. Our results indicate that a large part of the variance must be attributed to unidentified factors that may influence the sexual risk-taking behaviors of adolescent mothers. This vulnerable population may be affected greatly by special contextual and situational factors that make consistent condom use a challenge, such as the presence of a steady partner, current pregnancy status, and the use of other contraceptive methods to prevent repeat pregnancy.

The unexpected lack of group differences between participants receiving the HIV-prevention program and the health-promotion program on SCT, TRA, and TRB measures is similar to the findings reported by O’Leary et al.
In their study, no consistent treatment effects were observed on social cognitive mediators among STD clients receiving a small-group cognitive-behavior change intervention promoting HIV risk-reduction behaviors. The nature of our control condition, a general health-promotion program for adolescent mothers with some skill-building and empowerment activities (e.g., coping, communications) and content on ways to stay healthy, inadvertently may have had a positive influence on the theoretical variables measured in this study and on the outcome behaviors. Participants in the control group may have experienced increased feelings of confidence in themselves and transferred new communications skills from their mother-child relationship to their intimate partner relationship, thereby diminishing our ability to detect true group differences. In addition, responding to the lengthy questionnaire with numerous items involving attitudes toward condom use and sexual behaviors may have affected some of the adolescents by sensitizing them to their own behavior and creating feelings of greater responsibility for precautionary sexual practices and stronger commitment to practice them. To the extent that this actually occurred for an adolescent, positive changes in attitudes toward condom use may have resulted.

Study limitations

This study is limited in its generalizability because of the population used to test the model. However, it is critical to find out whether this model works in this important subgroup of young women who have a high risk for contracting STDs and HIV. Whether this model will be useful in predicting sexual risk behaviors of other high-risk youth is a potential question for future research. This study is based on the assumption that self-reported behaviors are accurate indicators of adolescent mothers’ actions. Although this approach is the norm in past research, reliability of data may vary somewhat among different populations. Because the study was conducted in an alternative school, adolescent mothers’ exposure to additional information about HIV could not be controlled. Although this is a limitation, it also can be considered a strength, owing to the fact that most school districts in the United States offer some instruction on AIDS, and supplementary curricula must be integrated within existing programs.

Implications for clinical practice

Based on the findings of this study, preventive interventions for young mothers should be designed to impact theoretical constructs affected in the model such as beliefs about condom use and sexual pleasure, the influence of peers and significant others in referent groups, and perceptions about control in sexual situations. Strategies need to be developed to address the influence of past behaviors on future behaviors because they directly influenced condom use and having multiple sex partners in this study and have been shown in past research to influence current norms and attitudes [28]. Activities that attempt to create favorable attitudes toward condoms and supportive subjective norms and develop skills may have a positive effect on intentions and behaviors. For example, self-efficacy may be enhanced through role play involving guided practice in sexual negotiations and other skill-building activities. Outcome expectancies about the adverse effects of condoms on sexual pleasure and partner reactions may be counterbalanced through facilitated discussions, experiential exercises, games, and viewing of culturally sensitive and developmentally appropriate videotapes. Supportive feedback by peers and facilitators in intervention groups may serve as a further positive reinforcement for behavior change. The effectiveness of these strategies on decreasing sexual risk behaviors has been shown in the evaluation of the HIV-prevention program for adolescent mothers [33] and in another investigation with non-child-bearing youth conducted by Jemmott and Jemmott [7].

However, interventions for adolescent mothers based on theoretical constructs alone are likely to be insufficient for promoting behavior change in this population. HIV-prevention programs for young mothers need to be focused more broadly, building on theoretical concepts while also addressing the realities in the lives of these young women. A comprehensive approach is needed in which consideration is given to factors at the community level and the social context in which sexual behaviors occur. Many adolescent mothers have experienced lifelong poverty and live in poor neighborhoods where community violence, substance use, social oppression, and risky sexual behavior are prevalent. These environmental conditions may have a profound effect on their lives and decision-making processes. Another important social consideration is that they also are developing or maintaining an intimate relationship with the father of their baby, creating the need for interventions to address issues related to trust in the relationship, and gender and power dynamics within the relationship, as influences on sexual risk taking. Similar to other poor women, adolescent mothers may feel unable to insist on condom use even though they are aware of the risks involved.

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