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ORIGINAL ARTICLE

Initiation of Sexual Intercourse Among Middle School Adolescents: The Influence of Psychosocial Factors

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Purpose: **To explore potential psychosocial predictors for initiation of sexual intercourse among middle-school, inner-city youth, using longitudinal data from the *Healthy and Alive!* project.**

Methods: **We conducted hierarchical, logistic regression with adjustment for intraclass correlation over two sequential periods, including seventh and eighth grades (N = 3163), to assess the independent influence of psychosocial and demographic factors. Internally reliable scales to assess psychosocial influences were created, based on major theories of behavior. The sample was 52% female, 51% black, 30% Hispanic, 9% white, and 3% Asian. At baseline, 13% of girls and 39% of boys reported already having initiated sexual intercourse.**

Results: **Personal and perceived peer norms about refraining from sex were a strong and consistent protective factor. Alcohol and other drug use, poor academic performance, male gender, and black race were consistent risk factors. Self-efficacy showed a mixed effect: protective in the seventh grade but increasing risk in the eighth grade. Speaking a language other than English was a protective factor in seventh grade. Both psychosocial and demographic factors provided independent explanatory power.**

Conclusions: **Psychosocial factors, particularly norms about having sex, influence initiation of sexual intercourse. These data suggest that programs to delay initiation of sexual intercourse should reinforce norms about refraining from sex.** © ***Society for Adolescent Medicine, 2004***

KEY WORDS:
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Risk behaviors

One million adolescents become pregnant, and 3 million new cases of sexually transmitted diseases (STDs) occur each year in persons aged less than 20 years [1]. A critical risk factor for both adolescent pregnancy and STDs is early age at the initiation of sexual intercourse [1–3] which has been associated with sexual risk behaviors including multiple sex partners and the failure to use contraceptive methods that protect against pregnancy and STDs [4–6]. Delaying the initiation of intercourse has significant personal and public health benefit, particularly for the youngest adolescents. Unfortunately, few rigorously evaluated programs have been able to demonstrate success in delaying the initiation of sexual intercourse [1].

An understanding of factors influencing initiation of intercourse can be useful in creating new programs designed to delay intercourse. Although much is known about demographic factors associated with early sexual behavior, less is known about

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the influence of psychosocial factors. Demographic factors that have been associated with early intercourse include: poverty, family structure, parenting practices, school underachievement, and involvement in other risk behaviors [1,3,8]. Many risk factor studies have used cross-sectional research designs, which may suggest potential etiologic factors, especially those clearly antecedent to potential outcomes. Cross-sectional designs are less useful in understanding the potential impact of factors that do not clearly precede the outcome. For example, school underachievement could be a cause or a consequence of adolescent sexual behavior, or it may simply reflect common environmental circumstances or personal characteristics.

Psychosocial factors, emerging from behavior science theory, have been used to understand adolescent sexual behaviors, particularly the use of condoms [8–11]. Predictors of condom use include self-efficacy, peer influences, perceived risk for STDs, and outcome expectations. These same concepts have been the basis of programs to increase condom use. The potential etiologic importance of psychosocial factors to the initiation of sexual intercourse is best assessed using longitudinal research designs. Such studies have been used recently to determine the association of such factors as self-efficacy with the initiation of sexual intercourse [12–13]. However, these studies did not examine middle school populations.

The *Healthy and Alive!* project was a 2-year (20 session) intervention program to reduce HIV risk behaviors on the basis of behavioral science principles. The evaluation for *Healthy and Alive!* created internally reliable scales for psychosocial factors to measure program impact. For this analysis, we have used these scales to examine the predictive importance of psychosocial factors on early initiation among inner-city, middle school youth. The study design included assessments at the beginning of seventh grade and at the end of seventh and eighth grades. We created and contrasted models of initiation and used sequential, multivariate models to determine the separate and combined effect of psychosocial and demographic factors.

Methods

This study, reviewed and approved by an Institutional Review Board at the Centers for Disease Control and Prevention (CDC), used data collected between 1994 and 1996 as a part of a two-year, longitudinal study of the *Healthy and Alive!* intervention. The methodology of collecting baseline (beginning of seventh grade, 1994) data and achieving retention rates of 80% at Time 2 (end of seventh grade, 1995) and 73% at Time 3 (end of eighth grade, 1996) are more completely described in Simkin et al [14].

Sampling

Multistage cluster sampling produced a sample of seventh graders representing 46 inner city schools from three urban school districts in New Jersey. Pairs of schools from each district were selected and matched based on size of school enrollment and racial and ethnic make-up for purposes of evaluating the intervention. All seventh-grade students from the participating schools, except for those enrolled in special education or limited English proficiency classes, were eligible for the intervention. Passive parental consent (i.e., notification of parents, but waiver of documentation of parental permission) and adolescent assent were obtained for each eligible student. Our initial sample included 3163 students who had agreed to participate in the study. We used a listwise-deletion strategy in developing our models; students who had missing data on sexual behavior or any of the explanatory variables used in a model or who has inconsistent responses over time (e.g., sexually experienced at Time 2 but no longer experienced at Time 3) were excluded from analysis. For example, 188 students were excluded because they did not report their sexual behavior data at baseline. Students who were already sexually experienced at baseline were excluded from modeling initiation of intercourse between baseline and Time 1. Similarly, sexually experienced students at Time 2 were excluded from modeling of initiation from Time 2 to Time 3. This strategy produced models with sample sizes ranging from 1270 to 1637 students.

Instrument

An 89-item paper-and-pencil instrument was developed by a team of researchers led by CDC to measure sexual behaviors, psychosocial constructs, and demographic profiles. Psychosocial scales were constructed using a multistep process. First, a subset of 50 of the 89 items was selected from the complete questionnaire based on item content and psychosocial variables from the major theories of behavior [8–13]. Second, the pattern of bivariate correlations among individual items was examined to assess

discriminant validity. On this basis, 50 items were classified into eight potential psychosocial variables. Next, factor analysis was used to refine scales and to establish their construct validity. The varimax-rotated solution with eight factors produced the simplest structure and was selected as a final solution. To assess the generalizability of the factor structure, the factor analyses were repeated separately by gender and sexual experience status (ever vs. never had intercourse). The Cronbach alpha for these scales was generally greater than .70 (Table 1). Initially, we thought personal and peer norms would be represented by separate scales, but the bivariate correlations and factor analysis suggested these should be combined. These young teens did not seem to differentiate between their understanding of peer norms and personal beliefs, although norms about refraining from sex and using condoms were clearly distinguished. Likewise, these analyses did not distinguish self-efficacy in refusing sexual advances and in using condoms in a variety of circumstances. A single scale for self-efficacy was therefore created. A more complete explanation of the process for developing the final eight scales is available from the authors (HIV/STD Prevention among Young Urban Adolescents: Psychosocial Variables, Psychometric Properties, and Association with Consistent Condom Use by Middlestadt SE, et al, unpublished manuscript).

Demographic variables included in the instrument were gender, race, self-reported school performance (grades), mother's education, father's education, parent(s) living with a student (parent), and the language spoken at home (language). Age of student was not included because subjects were selected based on grade level, which is highly correlated with age. Older students in our sample were therefore likely to have failed at least one grade.

Statistical Modeling

We used stepwise hierarchical logistic regression to develop all models [15–22]. Two-level models were used to adjust for intraclass correlation, which was caused by nesting of students in schools. The first level of the model represented students and the second level carried the school effect. The binomial assumption of the criterion variable was tested by un-constraining the binomial variance at level 1. The variance component model was used as a baseline. The linearizing expansion was first carried out by First Order and MQL methods. Once the final model was obtained, Second Order and PQL procedures were used to get the final estimates. All models were implemented using MLn software [23–24].

Two sets of models were developed to predict initiation of sexual intercourse. The first set predicted initiation at Time 2 using explanatory variables measured at baseline, and the second set did so at Time 3 using explanatory variables from Time 2. Each set included three models: demographic, psychosocial, and combined. The demographic model included: gender, race/ethnicity, grades, mother's education, father's education, parent living with student, language spoken at home, and interactions among these factors as explanatory variables. Gender had two levels: *females* and males. (Reference category in *italics*.) Race/ethnicity had three levels: *Blacks*, Hispanic (HISP), and Whites, Asians, and others (Other). Grades in school had three levels: *A's and B's*, B's and C's, C's or less. Mother's education had four levels: *did not finish high school*, finished high school (MHS), a degree or some college (MCOL), and not sure (MNS). Father's education also had four levels: *did not finish high school*, finished high school (FHS), a degree or some college (FCOL), and "not sure" (FNS). Parent had two levels: *Single or no parent* and both parents. Language spoken at home had two levels: *English only* and bilingual or language other than English. Because preliminary analyses suggested that the *Healthy and Alive!* intervention had not been effective in delaying initiation of sexual intercourse, students from intervention and control schools were combined. All demographic variables were dummy coded. Two-, three-, and four-way interactions of the demographic variables were tested in the model.

The psychosocial model was developed by using eight psychosocial subscale scores as explanatory variables. Psychosocial scale scores were converted to continuous standard scores with a mean of zero and standard deviation of one. The combined model used psychosocial and demographic variables that were statistically significant from their respective models. The demographic variables were added into the model before psychosocial variables. The two-, three-, and four-way interactions among explanatory variables were tested last.

All models were developed in a stepwise fashion. The explanatory variables were added first. Two-way interactions were added next. Three-way interactions were added last. When the model was saturated, statistically nonsignificant terms were removed and the statistical significance of the remaining terms in the model re-established. In situations where the model did not stay stable with all the

Table 1. Psychosocial Scales, Internal Consistency (Cronbach α), and Item Loadings

Item Content	Item Loading
Self-efficacy to refuse sex, alcohol, other drugs, and to use condoms (*Self-efficacy,* Cronbach α = .87)	
Refuse sex with someone at a party	.658
Refuse sex, even if a boy or girl/friend	.630
Refuse drugs/alcohol, could make the right decision	.719
Refuse drugs/alcohol, could communicate decision	.692
Refuse sex, until partner agrees to use a condom	.721
Could tell boyfriend or girlfriend to start using condoms	.731
Could tell first-time partner to use condoms	.751
Could convince boyfriend or girlfriend to use condoms, if using birth control pills	.730
Personal and perceived peer norms about refraining from sex (*Sex Norms,* Cronbach α = .78)	
Wait until older for sex (friends belief)	.721
Sex OK with a steady boyfriend or girlfriend (friends belief)	.742
Sex OK with a couple of different people/month (friends belief)	.630
Number students have had sex (personal belief)	.459
Wait until older for sex (personal belief)	.680
Sex OK with a steady boyfriend or girlfriend (personal belief)	.662
Sex OK with a couple of different people/month (personal belief)	.412
Barriers to buying, carrying, and using condoms (*Barriers,* Cronbach α = .77)	
Embarrassed to buy a condom	.675
Uncomfortable to carry a condom	.691
Carrying a condom means planning to have sex	.608
A hassle to put on condom	.473
Embarrassing to use a condom	.557
Certainty would use a condom correctly or explain use to partner	.452
Certainty would be able to buy condoms	.582
Certainty would have condom when needed for sex	.402
Personal and perceived peer norms supporting condom use (*Condom norms,* Cronbach α = .77)	
Use condom always for sex (friends belief)	.597
Use condom always for sex even with birth control pills (friends belief)	.659
Use condom even if the two people know each other very well (friends belief)	.668
Use condom always for sex (personal belief)	.657
Use condom always for sex even with birth control pills (personal belief)	.706
Use condom even if the two people know each other very well (personal belief)	.674
Communication with parents and other adults (*Communication,* Cronbach α = .82)	
Talked about abstinence with parents or other adult relatives	.735
Talked about condoms with parents or other (adult relatives)	.803
Talked about protection against HIV or STD with parents or other adult relative	.805
Talked about preventing pregnancy with parents or other adult relatives	.793
Comfortable talking about sex with parents	.591
Use of alcohol and other drugs in the previous 30 days (*Alcohol and drugs,* Cronbach α = .72)	
Alcohol use, at least one drink, number of days (past 30 days)	.737
Alcohol use, five or more drinks in 2 hours, number of days (past 30 days)	.745
Marijuana use, number of days (past 30 days)	.619
Cocaine use, number of days (past 30 days)	.580
Injectable steroids, number of days (past 30 days)	.592
Knowledge about STD and condom use (*Knowledge,* Cronbach α = .49)	
Latex condoms better than lambskin (against HIV)	.385
Condom use, baby oil and Vaseline good	.319
STDs increase risk of getting HIV	.402
Condom use, condom tip space important	.298
Signs of an STD (not including HIV)	
A sore on the sex organs	.726
Pain when urinating	.738
Perceived risk of STD/HIV (*Perceived risk,* Cronbach α = .82)	
My chances of getting an STD (excluding HIV), during next year	.884
My chances of getting HIV, during the next year	.889

two- and three-way interactions present, the interactions were added in batches. A batch included one three-way interaction and all its relevant two-way interactions. The interactions within a batch were tested for statistical significance. The nonsignificant interactions were removed before adding the next batch into the model. Simultaneous Chi-square tests were used to determine the joint statistical significance of multiple effects present in the model, the statistical significance of effects carrying two or more degrees of freedom, and single degree of freedom effects in relationship to other effects in the model.

Although we tested interaction terms in each of the six models, we ultimately dropped these from the three models in which significant interactions were found. We did this for several reasons. First, modeling with interaction terms created convergence problems with the software so that not all possible terms could be tested. Second, examination of significant interaction terms provided little practical information. Third, adding or removing interaction terms had little impact on the coefficients for main effects.

Results

Of the 2973 students who completed a baseline survey, 48% were males and 52% were female.

Table 2. Percent of Nonsexually Experienced Students who Initiated Sexual Intercourse Within Each Time Period, by Demographic Characteristics

	Time 1 to Time 2[a]		Time 2 to Time 3[b]	
Category	n	Reporting Initiation of Sexual Intercourse %	n	Reporting Initiation of Sexual Intercourse %
Total sample	1637	13	1524	15
Gender				
Male	599	19	534	17
Female	1038	9	990	14
Race				
Blacks	661	16	642	21
Hispanics	547	12	501	12
Whites, Asians, others	429	7	381	10
Mother education				
No high school	240	15	195	16
High school	341	14	327	18
College	439	13	408	16
Not sure	617	11	594	12
Father education				
No high school	153	12	143	15
High school	277	13	248	20
College	353	14	322	17
Not sure	854	14	811	13
Parental status				
Both parents	719	11	656	13
Single or none	918	14	868	16
Grades				
A's & B's	610	10	564	11
B's & C's	777	14	734	18
C's, D's, & F's	250	16	226	14
Language				
English only	754	16	703	19
Other languages	883	10	821	12

[a] Time 1 to time 2 is from the beginning of seventh grade to the end of seventh grade.
[b] Time 2 to time 3 is from the end of seventh grade to the end of eighth grade.

Fifty-one percent of these students were black, 30% Hispanic, 9% white, 3% Asian, and 6% other. At baseline, most students (84%) were aged 12 and 13 years and males were somewhat older than females. Mother's educational attainment varied widely. More than one-third of the students (36%) were unsure about their mother's education; 18% of mothers were reported to have a college degree, 12% to have some college education, 21% to have graduated from high school, and 13% to have not finished high school. At baseline, 13% of girls and 39% of boys reported already having initiated sexual intercourse.

Thirteen percent of the sample initiated sexual intercourse between the Fall of seventh grade (Time 1) and the Spring of seventh grade (Time 2) (Table 2).

Table 3. Final Models for Predicting Initiation of Sexual Intercourse by the End of Seventh Grade (Time 2), Using Variables Measured at Beginning of Seventh Grade (Time 1)

Parameter	Estimate	SE	df	χ^2	OR
A. Psychosocial Model N = 1517					
Constant	−1.9770	0.0882			0.14
Self-efficacy	−0.1874	0.0726	1	6.66**	0.83
Sex Norms	−0.3973	0.0708	1	31.49***	0.67
Alcohol and drugs	0.1751	0.0693	1	6.38**	1.19
B. Demographic Model N = 1637					
Constant	−2.1850	0.1714			0.11
Gender	1.0980	0.1582	1	48.13***	3.00
Language	−0.5302	0.2518	1	4.43*	0.59
Race			2	12.83**	
Hispanics	−0.1325	0.2764			0.88
Whites, Asians, others	−0.8302	0.2684			0.44
Grades			2	6.05*	
B's & C's	0.2999	0.1766			1.35
C's & D's & F's	0.5405	0.2265			1.72
C. Combined Model N = 1527					
Constant	−1.9910	0.1357			1.14
Gender	0.9143	0.1693	1	29.16***	2.50
Language	−0.6252	0.2563	1	5.95*	0.54
Race			2	9.09**	
Hispanics	0.0346	0.2831			1.04
Whites, Asians, Others	−0.6317	0.2742			0.53
Sex norms	−0.2875	0.0747	1	14.81***	0.75
Alcohol and drugs	0.2506	0.0716	1	12.24***	1.29
Self-efficacy	−0.1665	0.0763	1	4.76*	0.85

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

This percentage was 15% between Time 2 and the spring of eighth grade (Time 3). At Time 2, the percentage of students who had initiated sexual intercourse was higher among males than females (19% vs. 9%); higher among academically low achieving students than most high achievers (16% vs. 10%); higher among Blacks (16%) and Hispanics (12%) than Whites, Asians, and other races (7%). More adolescents living with single parents or no parent and more students who spoke only English at home also reported initiating sexual intercourse. A similar trend appeared in Time 3 data. No trend was observed across levels of mother's or father's education at either time period.

Initiation of Sexual Intercourse During Seventh Grade

The final psychosocial model identified (Table 3) "sex norms" (i.e., personal and perceived peer norms about refraining from sex) as the single best predictor of the initiation of sexual intercourse ($p \leq .001$). Students who scored higher on sex norms were less likely to initiate sexual intercourse than those who

scored lower. Adolescents scoring high on self-efficacy also were less likely to initiate intercourse. The use of alcohol and other drugs significantly increased the likelihood of initiating sexual intercourse. Other psychosocial predictors such as condom norms, barriers, knowledge, communication, and perceived risk, were not statistically significant.

Gender was statistically the most significant predictor for initiation of sexual intercourse in the demographic model ($p \leq .001$). Males were more likely to initiate intercourse than females (OR = 3.0). Race was the second best predictor ($p \leq .01$). Whites, Asians, and others were less likely than Blacks to initiate sexual intercourse (OR = .44). Language spoken at home and academic performance were also significantly predictive of initiating sexual intercourse. Participants who were bilingual or spoke a language other than English at home were also less likely to initiate intercourse, as were students who earned A's and B's. Students receiving grades of C or lower were 1.7 times more likely to initiate sexual intercourse than those receiving higher grades. Mother's education, father's education, and living in a two-parent household were not significant predictors of the initiation of sexual intercourse.

All statistically significant predictors from the final psychosocial and demographic models and their interactions were included in the combined model to predict initiation of sexual intercourse (Table 3). Gender was the most significant predictor ($p \leq .001$) with males were more likely to initiate sexual intercourse than females (OR = 2.5). Language was the second best predictor among demographic variables ($p \leq .01$) with adolescents who were bilingual or spoke a language other than English at home were half as likely to initiate sexual intercourse than those who spoke only English (OR = .50). Whites, Asians, and others were less likely to initiate compared with Blacks; initiation among Blacks and Hispanics were not different. Grades were no longer statistically significant predictors.

Among psychosocial variables in the combined model, sex norms remained the single best predictor of initiation of sexual intercourse ($p \leq .001$). Adolescents who indicated more protective norms by scoring higher on sex norms scale were less likely to initiate sexual intercourse than those who scored lower, and the odds of initiating sexual intercourse changed by .75 for every one standard deviation change in scores. Alcohol and drug use was the second best psychosocial predictor ($p \leq .001$). Adolescents who used alcohol and other drugs were more likely to initiate sexual intercourse than those who refrained from these substances or used less frequently (OR = 1.3). Self-efficacy remained a statistically significant predictor.

Table 4. Final Models for Predicting Initiation of Sexual Intercourse at the End of Eighth Grade (Time 3), Using Variables Measured at the End of Seventh Grade (Time 2)

Parameter	Estimate	SE	df	χ^2	OR
A. Psychosocial Model, N = 1270					
Constant	−1.7620	0.0848	1		0.17
Self-efficacy	0.1997	0.0906	1	4.84*	1.22
Barriers	0.2662	0.0833	1	10.17**	1.30
Perceived Risk	0.1759	0.0720	1	5.96*	1.19
Sex norms	−0.4243	0.0755	1	31.54***	0.65
Alcohol and drugs	0.2976	0.0720	1	17.06***	1.35
B. Demographic Model, N = 1524					
Constant	−1.5520	0.2691			0.21
Gender	0.4286	0.1556	1	7.78**	1.54
Race			2	24.13***	
Hispanics	−0.7027	0.1785			0.50
Whites, Asian, Others	−0.8544	0.2169			0.43
Grades			2	6.26*	
B's & C's	0.5063	0.1697			1.66
C's & D's & F's	0.3091	0.2391			1.36
Mother education			3	14.43***	
High school	−0.1275	0.2511			0.88
College	−0.2546	0.2478			0.78
Not sure	−0.5383	0.2383			0.58
C. Combined Model, N = 1272					
Constant	−1.7690	0.1769			0.17
Gender	0.3682	0.1808	1	4.15*	1.45
Race			2	24.76***	
Hispanics	−0.8230	0.2005			0.44
Whites, Asians, others	−0.9776	0.2337			0.38
Grades			2	9.19**	
Bs & Cs	0.5509	0.1819			1.73
Cs & Ds & Fs	0.3949	0.2626			1.48
Sex norms	−0.3081	0.0812	1	14.40***	0.73
Alcohol and drugs	0.3968	0.0756	1	27.55***	1.49
Barriers	0.2943	0.0852	1	11.92**	1.34
Perceived risk	0.1456	0.0730	1	3.94*	1.16
Self-efficacy	0.2139	0.0928	1	5.34*	1.24

* $p \leq .05$; ** $p \leq .01$; *** $p \leq .001$.

Initiation of Intercourse Between Seventh and Eighth Grades

The model for predicting initiation of sexual intercourse at Time 3 was carried out for students who reported at Time 2 that they had never had sexual intercourse (Table 4). Five out of seven psychosocial scales were statistically significant in the psychosocial model: sex norms, alcohol and drug use, barriers, perceived risk, and self-efficacy. Of these, sex norms, barriers, and alcohol and drugs were the three strongest predictors of initiation of sexual intercourse at

Time 3. Knowledge, norms about condom use, and communication with parents and other adults were not significant.

In the demographic model, race was the most predictive variable ($p \leq .001$) followed by mother's education ($p \leq .05$). Hispanics were half as likely than Blacks to initiate sexual intercourse (OR = .50). Whites, Asians, and others were also less likely than Blacks to initiate sexual intercourse. Adolescents whose mothers had a college education were less likely to initiate sexual intercourse as adolescents whose mothers did not finish high school (OR = .78). Boys were more likely to initiate sexual intercourse than girls (OR = 1.5). Adolescents who earned B's and C's were 1.66 times more likely to initiate sexual intercourse than those who received A's and B's (OR = 1.7).

Race remained statistically significant in the combined model (Table 4). Grades were also statistically significant. Adolescents who received a grade of B or lower were more likely to initiate sexual intercourse than adolescents who earned A's and B's (OR = 1.48 to 1.73). Gender also stayed statistically significant. Boys remained 1.45 times more likely to initiate sexual intercourse than girls. Again, parent education was not statistically significant.

Four out of five psychosocial predictors that were statistically significant in the psychosocial model remained so in the combined model. Alcohol and drug use was the best single predictor of initiation of sexual intercourse ($p \leq .001$). The odds of initiating sexual intercourse increased 1.5 times if the use of alcohol and drugs increased by one standard deviation. Sex norms (i.e., norms about refraining from sex) were the second best psychosocial predictor ($p \leq .001$); again, adolescents with positive norms were significantly less likely to initiate sexual intercourse. Perceived risk ($p \leq .05$) and self-efficacy ($p \leq .05$) were also statistically significant and directly correlated with the likelihood of initiating sexual intercourse. The effect of self-efficacy in this model was opposite to that found at Time 2, where self-efficacy inversely correlated with the early initiation of sexual intercourse. The barriers scale was not statistically significant.

Discussion

These analyses strongly suggest that psychosocial factors influence the early initiation of sexual intercourse. Consistent predictors included personal and perceived peer norms and the use of alcohol and other drugs. Peer norms about refraining from sex was a strong and consistent protective factor against initiating sexual intercourse during both seventh and eighth grade. On the other hand, alcohol and other drug use consistently increased the risk of initiation. Although self-efficacy showed a protective effect in the seventh grade, it increased the risk for initiation in the eighth grade. Consistent with previous research, demographic factors such as male gender and black race also were associated with increased likelihood of initiating intercourse. Doing poorly in school, as measured by usual grades, was also associated with initiation of sexual intercourse. Speaking a language other than English was a protective factor in seventh grade. Greater perceived risk of STD/HIV, and more perceived barriers to condom use were associated with increased risk of initiation during eighth grade.

Our finding of an association between norms and initiation of intercourse suggests the potential to delay the initiation of intercourse by influencing personal values and perceptions of peer behaviors. Youth development and HIV education programs that stress both delay in initiation and risk reduction have been effective in delaying initiation of intercourse [7].

Consistent with previous research, we found a positive association between alcohol and other drug use and initiation of intercourse [25]. This relationship may result from a variety of hypothesized mechanisms such as pharmacologic disinhibition, co-occurrence of behaviors among adolescents prone to engage in risks, and socialization about behaviors that often occur in similar social settings [26–27]. The relationship between alcohol and other drug use and sexual risk behaviors is a complicated one, reflecting a variety of possible etiologic mechanisms that suggest the need for a variety of intervention types [26–27]. Our data suggest that programs that effectively reduce use alcohol and drug use may have additional value in delaying the initiation of sexual intercourse.

Adolescents clearly distinguished norms about refraining from sexual intercourse and norms about condom use, both in the factor analysis creation of these psychosocial scales and in their predictive value. The normative scale for refraining from sexual intercourse was associated with delayed initiation during both time periods, but norms about condom use were not significant in either period. Even these middle school adolescents seem to be able to differentiate values about these two behaviors, which seem to influence behavioral choices. Importantly, adolescents did not distinguish between personal

beliefs and belief of friends. Although we had initially attempted to create two separate scales, our factor analysis identified a single latent factor. We believe that this is a specific consequence of early adolescent development, where little to no differentiation exists between the youth's personal beliefs and the perceived beliefs of peers.

Speaking a language other than English at home was a protective factor; presumably this is a marker for recent immigration. Many recent immigrants to the United States may come from cultures that support later initiation of sexual intercourse. The significance of language in our analysis may, therefore, reflect the importance of culture in shaping adolescent sexual behavior. Finally, the findings of earlier initiation among black teens presumably reflects influences of cultural circumstances and socioeconomic status.

Performing poorly in school was associated with an increased risk of initiating sexual intercourse. Poor school performance may reflect low connectedness to school or social support from family and community. Recent findings from the Add Health study [28] have supported the notion that school connectedness is an important protective factor against a range of adolescent risk behaviors.

Perhaps our most troubling finding is the mixed direction of the association of self-efficacy with initiation of sexual intercourse. Other studies find a generally consistent effect of self-efficacy in using condoms for increasing actual usage [1,7–11]. In our initial psychosocial scale development, we found that students did not distinguish well among self-efficacy in refusing sexual activity, refusing drug use, or using condoms. This failure to distinguish may also reflect psychological development in early adolescence. Because of the difference between our generalized measure of self-efficacy and measures developed by other investigators that stress activity self-efficacy, this finding should be interpreted with caution.

Unexpected findings included the association of initiation of sexual intercourse with high perceived risk of STD/HIV and with barriers to condom use. In cross-sectional studies of adolescent sexual risk behaviors, perceived risk has often shown little association with sexual risk behaviors or protective measures such as condom use. In our longitudinal study, adolescents reported greater perceived risk of STD/HIV but demonstrated an *increased* probability of initiating intercourse in the subsequent period. Adolescents at risk of initiation may anticipate initiation, or the relationship of perceived risk to actual behavior is more complicated than we currently understand.

We also expected to see little effect or a protective one between barriers to condom use at baseline and subsequent initiation of intercourse. Adolescents who anticipate initiating intercourse may develop a more realistic understanding of the difficulties in using condoms. These findings about perceived risk and barriers to condom use should be a cautionary note about efforts to prevent the early initiation of intercourse by teaching adolescents about the dangers of sex or the problems with condoms.

Limitations

A number of limitations of our study should be noted, especially the difficulties in measuring sexual behaviors and psychosocial factors for middle school youth. Potential measurement challenges include cognitive difficulties, social desirability bias, and concerns about confidentiality [29–30]. Younger adolescents may not have attained formal operational thinking and may have difficulty understanding and responding to questions beyond their current experience (e.g., a nonsexually experienced adolescent responding to questions about condom use). Our self-efficacy questions, which presented short potential scenarios may have been difficult for adolescents to answer. We made efforts to use simple and familiar language and to provide reassurance about confidentiality in surveying students. However, these efforts may not have overcome the developmental challenges. The clear results of our psychometric efforts in scale development provide some reassurance regarding the cognitive skills of the adolescents we surveyed. Although we found hints of the importance of adolescent development in influencing psychosocial development, the influence of developmental issues is difficult to capture in classroom surveys. The sample, which was predominantly inner city and minority, provides limited generalizability.

Conclusions

Our findings suggest the potential for program efforts which address adolescent personal and perceived norms about refraining from sexual intercourse and which address alcohol and drug use among youth. Conversely, these data provide little support for efforts to increase self-efficacy to refuse sexual advances; clearly greater understanding is needed in this area. Additional longitudinal studies

are needed to establish the sequence of developmental events in adolescence leading up to initiation of sexual intercourse.

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This paper reflects the contributions of all six authors. The *Health and Alive!* project worked as a collaborative enterprise with frequent conference calls and meetings to discuss every aspect of project implementation including the intervention, data collection, and data analysis. Our meetings were used to review intellectual and practical issues for the project. The idea for this paper grew out of these meetings, and the group contributed at multiple stages as ideas were refined, the prospectus was written, data were analyzed, and the paper was written. As such, it is difficult to pinpoint anyone's total contribution. The description below describes each person's primary contributions. John Santelli was the project officer from CDC and conceived of the idea for this paper, guided the data analysis, and wrote each draft of the paper. Javaid Kaiser was the statistician for this paper and other papers from this project. He conducted the multivariate analyses and advised the project on the use of multiple level analysis. Lesley Hirsch was a research associate on the project. Under the guidance of Dr. Kaiser she conducted many of the statistical analyses for the project. She reviewed drafts of the paper and provided extensive comments. Alice Radosh was the principal investigator for the *Health and Alive!* project. She provided overall direction to the project, contributed to the review of the prospectus for this study, and reviewed drafts of the paper. Linda Simkin was the project director for the *Health and Alive!* project. She supervised all aspects of the project including data collection and wrote the primary methods paper. She contributed to the review of the prospectus for this study and reviewed drafts of the paper. Susan Middlestadt was the lead evaluator on this project. She conceived of the psychosocial scales and wrote the psychosocial scaling paper for the project. As an expert in behavior change theory, she guided the primary author in developing the prospectus for this study. She reviewed drafts of the paper.

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