

Multi-level Factors Associated with Pregnancy among Urban Adolescent Women Seeking Psychological Services

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ABSTRACT *The purpose of this study was to examine the prevalence of pregnancy as well as multi-level factors (i.e., individual, family, and environment) associated with history of pregnancy among a sample of urban adolescent women seeking psychological services. Data were collected from a total of 264 sexually active, 13–18-year-old, adolescent women who participated in a larger HIV prevention study. Adolescents and one participating parent completed an audio computer-assisted self-interviewing survey. A total of 17.4 % of participants reported a history of pregnancy. A multivariable logistic regression model suggests that after controlling for empirically derived sociodemographic and behavioral covariates, absence of father in the home, family support and cohesion, and neighborhood risk were positively related to pregnancy. This study is among the first to examine multi-level factors associated with pregnancy among adolescent women diagnosed with psychological disorders. Consideration of such factors is crucial both in terms of clinical practice and in the design of pregnancy prevention programs. Collaboration between physicians and mental health providers working with adolescent women is crucial and represents an ideal opportunity to promote parental involvement and access to supportive community resources, including pregnancy prevention programs for this vulnerable population of adolescents.*

KEYWORDS *Adolescent pregnancy, Psychological disorders, Family dynamics, Neighborhood environment*

While a national decline of 37 % in teen birth rates has been documented between 1991 and 2009, teen pregnancy rates in the US are approximately nine times higher compared to other developed nations.^{1–3} Adverse outcomes of teen pregnancies include low birth weight, preterm birth, and infancy death.^{4,5} Furthermore, teen mothers are more likely to drop out of school resulting in the perpetuation of a transgenerational cycle of disadvantage as their own children are also more likely to drop out of school and experience teen pregnancy.^{6,7}

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Several US studies have investigated correlates of pregnancy among general population adolescents identifying socioeconomic status, family dynamics, and neighborhood environment as main contributing factors.⁸⁻¹⁰ Results suggest that both male and female adolescents from two-parent families initiate sex later, are more likely to use contraception, and less likely to experience pregnancy compared to teens from single-parent families.¹¹⁻¹³ Furthermore, quality of family relationships appears to influence sexual risk behaviors associated with adolescent pregnancy such that adolescents who report good family communication and adequate parental support and monitoring tend to have later sexual debut, fewer sex partners, and increased condom use.¹⁴⁻¹⁹ Conversely, disruptions in parental involvement and unhealthy peer/partner influences are associated with adolescents' tendency to engage in risky sexual behavior leading to pregnancy.^{15,20} Among the few studies assessing neighborhood environment as an antecedent to teen pregnancy, some suggest that youth living in high poverty neighborhoods are more likely to experience high school dropout and teen pregnancy compared to youth living in low poverty neighborhoods even after controlling for family income, parent education, welfare receipt, and family structure.^{8,21-24}

Studies investigating the risk of pregnancy among adolescent women diagnosed with psychological disorders are scarce, although extant research among adolescents demonstrates an association between mental illness and high-risk sexual behavior including early initiation of sexual activity, sex with multiple partners, and unprotected sex.²⁵⁻²⁷ Results from these studies suggest that this vulnerable population is at increased risk of experiencing pregnancy, particularly those diagnosed with depression and early-onset conduct disorder.²⁸⁻³⁰

Adolescents living with psychological disorders navigate through individual, interpersonal, and environmental/community factors shown to contribute to high-risk sexual behaviors and possible exposure to sexually transmitted infections.³¹⁻³⁵ While these studies have associated such a risk profile with elevated exposure to sexually transmitted infections, a similar profile may also contribute to elevated pregnancy rates among adolescents seeking psychological services. To date there is a paucity of research examining the association between multiple socio-ecological factors, personal risk factors, and teen pregnancy among adolescent women receiving mental health treatment. The current study examines the prevalence of pregnancy as well as multi-level factors (i.e., individual, family, and environment) associated with history of pregnancy among a sample of urban adolescent women seeking psychological services.

METHODS

Participants

This is a substudy of a larger multisite, family-based, HIV prevention, randomized clinical trial. Adolescents eligible to participate in the study were between 13 and 18 years of age, had received a clinician-based psychological diagnosis, were receiving in- or out-patient mental health treatment at the time of recruitment, and lived with a parent/guardian who was also willing to participate in the study and provided informed consent. Adolescents were excluded if they were diagnosed with schizophrenia and other psychotic disorders, had a history of sexually aggressive behavior, were knowingly pregnant at time of enrollment, were known to have tested positive for HIV, or had cognitive deficits precluding them from completing

the assessment independently or participating in group activities. Participants were enrolled in the study at three sites: Brown University and Rhode Island Hospital, University of Illinois, Chicago, and Emory University. Clinics and hospitals providing adolescent mental health services served as recruitment sites. Of 1,102 adolescents who met eligibility criteria, 891 (81 %) agreed to participate and completed baseline assessments. Of the 891 participants, 264 (29.6 %) were sexually active females and comprised the sample analyzed in the current study. The remaining 627 participants were either male or sexually inexperienced females. The Institutional Review Boards at all three study sites approved the study protocol.

Procedures

Adolescents and parents completed an audio-assisted computerized interview at baseline assessing sociodemographic characteristics, sexual behavior patterns, psychosocial characteristics, and psychological symptomatology.

Measures

Individual-Level Measures. Participants' age, race, ethnicity, presence of father in the home, history of pregnancy, marijuana use, and contraceptive behavior were collected from adolescents. Family income data and parent education status were collected from parents.

Computerized Diagnostic Interview Scheduled for Children-IV. This structured computer-assisted diagnostic interview was administered to parents and adolescents separately for purposes of deriving symptom counts. Parents were asked to report on adolescent symptoms only. Reliability and validity of the Computerized Diagnostic Interview Scheduled for Children-IV (CDISC-IV) are acceptable.^{36,37}

Consistent with prior studies, we utilized a combination of both parent and adolescents responses to assess number of symptoms for the following disorders: major depressive disorder, generalized anxiety disorder, post-traumatic stress disorder, mania, hypomania, oppositional defiant disorder, and conduct disorder.^{38,39} Symptoms of attention deficit/hyperactivity disorder were also assessed; however, due to historically poor validity and reliability of youth reports, only data obtained from parents were utilized for this disorder.³⁶

Family-Level Measures. *Parental-Adolescent General Communication* was assessed using a ten-item subscale focusing on open communication.⁴⁰ A sample item includes "If I was in trouble, I could tell my parent" with answer options ranging from (1) strongly disagree to (5) strongly agree. Scale responses could range from 10 to 50 with higher scores suggesting more open family communication (Cronbach's alpha = .92).

The *Parenting Style Questionnaire* was used to measure the degree of adolescents' perceived parental supervision and monitoring.⁴¹ Participants were asked whether their parent(s): (1) allowed them to go out as often as they wanted; (2) let them go anywhere without asking permission; and (3) were less strict than most other parents. Answer options ranged from 1 (very true) to 5 (not at all true). Scale responses could range from 3 to 15 with higher scores suggesting stricter parental monitoring (Cronbach's alpha = .73).

The *Family Relationship Scale* was used to measure family support and cohesion.⁴² Adolescents answered ten questions such as “Family members ask each other for help” with answer options ranging from 1 (not true at all) to 4 (almost always or always true). Scale responses could range from 10 to 40 with higher scores suggesting greater support and closeness within the family unit (Cronbach’s $\alpha = .75$).

Environmental-Level Measures. *Neighborhood environment* was assessed using a six-item index asking participants to indicate whether their neighborhood was characterized by the following: (1) broken bottles/trash, (2) people drunk/high, (3) abandoned/boarded-up buildings, (4) neighbors stealing/damaging property, (5) seeing homeless people every day, and (6) seeing lots of poor people.⁴³ Responses to all six items were summed and participants were categorized in one of two groups based on the resulting median split value: (1) living in a low-risk environment (none, one, or two of the six items were endorsed) and (2) living in a high-risk environment (three or more of the six items were endorsed).

Statistical Analysis

First, descriptive analyses were conducted to obtain means, standard deviations, and proportions for relevant sociodemographic variables. Additionally, bivariate analyses consisting of chi square and independent samples *t* tests were performed to examine associations among adolescents with and without a history of pregnancy and sociodemographic variables to identify potential covariates. Finally, a multivariable logistic regression model was conducted to explore factors associated with pregnancy after controlling for potential confounders. Data were analyzed using PASW 18.

RESULTS

A total of 264 adolescent women participated in this study (mean = 15.33; SD = 1.26; range 13–18). Approximately 60 % ($n = 147$) of families reported an annual income of less than \$30,000. Nearly 31.0 % ($n = 80$) of families self-identified as Caucasian, 56.7 % ($n = 148$) as African American, 11.5 % ($n = 30$) as Hispanic, and 2 % ($n = 6$) as other. Among parents, nearly 27 % ($n = 71$) completed high school, while 17.5 % ($n = 46$) had not graduated from high school. Among adolescent participants, 17.4 % ($n = 46$) reported a pregnancy in the past and 56.5 % ($n = 148$) reported no father in the home.

Psychological disorders, as measured by the CDISC-IV are represented as follows: oppositional defiant disorder (68.2 %), attention deficit/hyperactivity disorder (54.5 %), conduct disorder (44.7 %), generalized anxiety disorder (38.3 %), major depression (37.5 %), mania (25.4 %), post-traumatic stress disorder (25.0 %), and hypomania (23.1 %). These rates represent dual diagnoses, therefore they sum to greater than 100 %. In fact, due to the limited number of participants reporting only one disorder, we had insufficient power to assess associations between each individual disorder and history of pregnancy. Therefore, consistent with prior research and psychiatric categorization, participants were grouped into five categories: (1) internalizing; (2) externalizing; (3) co-morbid; (4) mania, and (5) did not meet criteria.³⁹ The latter category consisted of adolescents were in mental health treatment, and thus met criteria for inclusion in this study; however, their self-report and parent report symptomatology did not reach threshold criteria for any of

the disorders assessed on the CDISC-IV. These adolescents may have met criteria for other disorders (e.g., adjustment disorder), and/or since this sample was recruited from mental health treatment clinics and hospitals, it is possible that the severity of symptoms may have subsided over the course of treatment and prior to completing the CDISC-IV. Using this categorization, the following distribution was observed: 32.6 % co-morbid, 25.4 % mania/hypomania, 21.2 % externalizing, 5.7 % internalizing, and 15.2 % did not meet criteria.

Descriptive statistics and differences between participants with and without a history of pregnancy are presented in Table 1. Of these, adolescent age, condom use behavior, and history of marijuana use were statistically related to history of pregnancy at $p \leq .20$ level, and were therefore included as covariates in the multivariable logistic regression model.⁴⁴ Bivariate associations between individual, family, and environmental level factors and history of pregnancy are presented in Table 2. Those significantly associated with history of pregnancy at $p \leq .20$ were included in the multivariable model; all others were excluded.

Results of the multivariable logistic regression model are presented in Table 3. After controlling for covariates, significant factors associated with pregnancy

TABLE 1 Characteristics of participants with and without a history of pregnancy

	No history of pregnancy ($n=46$)		History of pregnancy ($n=218$)		p value
	Mean (SD)	N (%)	Mean (SD)	N (%)	
Sociodemographic factors					
Age of adolescent	15.85 (1.05)		15.22 (1.27)		.002
Race					
Caucasian		10 (21.7)		70 (32.1)	
African American		30 (65.2)		188 (54.1)	
Other		1 (2.2)		5 (2.3)	
Ethnicity					
Hispanic		5 (10.9)		25 (11.6)	.89
Non-Hispanic		41 (89.1)		191 (88.4)	
Family income					
$\leq 30K/year$		26 (66.7)		121 (58.5)	.34
$>30K/year$		13 (33.3)		86 (41.5)	
Parent educational status					
High school		21 (48.8)		119 (55.6)	.42
College and above		22 (51.2)		95 (44.4)	
Behavioral risk factors					
Adolescent condom use behavior					
Consistent condom use		6 (13.3)		104 (51.2)	.001
Inconsistent condom use		39 (86.7)		99 (48.8)	
Multi-method contraceptive use					
Multi-method use		12 (26.1)		76 (35.2)	.24
Multi-method non-use		34 (73.9)		140 (64.8)	
History of marijuana use					
Ever smoked marijuana		29 (64.4)		116 (53.7)	.19
Never smoked marijuana		16 (35.6)		100 (46.3)	

TABLE 2 Bivariate associations between study variables and history of pregnancy

	History of pregnancy (<i>n</i> =46)		No history of pregnancy (<i>n</i> =218)		<i>P</i>
	Mean (SD)	<i>N</i> (%)	Mean (SD)	<i>N</i> (%)	
Individual level factors					
Psychological diagnosis					.44
Externalizing disorder		6 (13.0)		51 (23.4)	
Internalizing disorder		2 (4.3)		13 (6.0)	
Co-morbid disorders		16 (34.8)		69 (31.7)	
Mania		12 (26.1)		55 (25.2)	
Did not meet CDISC-IV criteria		10 (21.7)		30 (13.8)	
Family level factors					
Positive communication	34.89 (12.07)		33.56 (10.31)		.45
Parental monitoring	10.30 (3.09)		10.76 (3.01)		.36
Family support and cohesion	29.53 (5.71)		27.74 (5.38)		.05
Family composition					.003
Father present		11 (23.9)		103 (47.7)	
Father absent		35 (76.1)		113 (52.3)	
Environmental level factor					
Neighborhood environment					.16
High risk		24 (52.2)		88 (40.7)	
Low risk		22 (47.8)		128 (59.3)	

emerged among two contextual levels of analysis: family and neighborhood environment. Specifically, compared to participants who reported having a father in the home, those who reported an absentee father were nearly 3.5 times more likely to have had a pregnancy ($p=.003$). Family support and cohesion was also significantly related to pregnancy such that for each unit increase in family support and cohesion there was an 11 % increase in likelihood of pregnancy ($p=.013$). Finally, participants residing in high-risk neighborhoods were twice as likely to have been pregnant compared to those living in low-risk environments ($p=.028$).

DISCUSSION

The prevalence of pregnancy in this purposive sample of adolescents was 17.4 %, which is considerably higher compared to the estimated rate of 4 % in a probability

TABLE 3 Multivariable associations between family and environmental level factors and history of pregnancy

	Prevalence ratio	AOR ^a	95 % CI	<i>p</i> value
Interpersonal level factors				
Father absent from home	2.45	3.47	1.53–7.89	.003
Family support and cohesion	NA	1.11	1.02–1.20	.013
Environmental level factor				
Risky neighborhood environment	1.46	2.40	1.10–5.24	.028

Model fit: $\chi^2=52.93$; $p=.001$

^aAdjusted odds ratio using no history of pregnancy as the referent category; models are controlling for adolescent age, condom use, and marijuana use

sample of general US adolescents in 2009.¹ Several factors may contribute to this discrepancy. First, in our study pregnancy was assessed over the adolescents' life time rather than over a 12-month period. Additionally, the rate of 4 % is based on live births, while our measure did not assess live births specifically. Finally, nationwide surveillance data suggest that among minority adolescents residing in southern states, pregnancy rates may reach 12–16 %, which is more consistent with estimates from our current sample that comprises nearly 70 % of minority adolescents, 30 % of whom resided in the southeastern US.^{1,45}

Two family level factors emerged as significant correlates of pregnancy: family composition and family support and cohesion. Adolescents from father absent homes were nearly 3.5 times more likely to experience pregnancy, corroborating prior findings.⁴⁶ Specifically, a longitudinal study of over 700 adolescent girls in the US and New Zealand suggests that not only does father absence place daughters at risk for adolescent pregnancy but, daughters raised in father absent home earlier in their developmental period were seven to eight times more likely to experience pregnancy compared to daughters from father present homes.⁴⁶ In contrast, daughters whose fathers were absent later in their developmental period were only two to three times more likely to experience pregnancy compared to daughters from father present homes.

Mechanisms by which growing up with an absentee father and adolescent pregnancy are associated remain unknown. According to Life-Course Adversity models, familial and ecological stress undermines the quality of the family environment thus promoting early sexual activity and pregnancy in daughters. Specifically, father absence is conceptualized as one of many stressors that covaries with other family level factors associated with teen pregnancy such as poverty, conflictual family relationships, and erosion of parental monitoring and control.^{15,47–49}

Supporters of Life-Course Adversity models suggest that it is not father absence per se but the other stressors associated with father absence that promote early sexual activity and the risk of pregnancy. Alternate findings support the idea that father absence is more than a proxy for other risk factors; rather, it is itself a significant contributor to high-risk sexual activity and pregnancy, even after controlling for covariates such as poverty.⁴⁶ Current study results appear to support the latter assertion, in light of the null findings between family income, parental educational status, race, ethnicity, and history of pregnancy. In fact, absence of father was significantly associated with pregnancy even after including family support and cohesion and environmental risk in the model.

The second family level factor, family support and cohesion, while significantly related to history of pregnancy, was inversely related compared to other studies,^{15,18} such that higher family support and cohesion were associated with history of pregnancy. Due to the cross-sectional nature of this study, we cannot draw conclusions regarding temporal order. It is possible that adolescents reported perceptions of their family's level of support and cohesion subsequent to their pregnancy. Adolescents may have received additional support from their family (i.e., mother, other siblings, extended family) after the birth of their child in the form of assistance with child rearing and monitoring, financial, and/or emotional engagement. This explanation is feasible especially among a predominantly minority adolescent population as substantiated by prior research suggesting that among African Americans, for example, family members and peers may be more supportive of adolescent pregnancy than among Caucasians.⁵⁰

Some departures from the extant literature are noteworthy. First, in this sample of adolescent women neither communication with parents ($p=.45$) nor parental monitoring ($p=.36$) were significantly related to pregnancy. The null finding for parental communication may be a function of the measures utilized in this study. Open parental communication did not assess communication related to teen pregnancy specifically; rather, the measure assessed the degree to which adolescent women felt comfortable discussing general problems with their parent. Thus, study participants may not have considered risk factors or sexual relationships as part of their open communication or parent monitoring interactions. It may also be that parent-child communication about sexual behavior, decision making, and teen pregnancy are unique topics that do not correspond to overall levels of communication. Lastly, type of psychological disorder was not associated with history of pregnancy. This may be a function of how we categorized disorders for purposes of maximizing power. While prior studies assessed specific diagnostic groups, due to the restricted sample size observed for each disorder, such comparisons were not possible in this study.^{28,30}

Finally, risky neighborhood was a significant environmental level factor associated with pregnancy suggesting that adolescents living in physically chaotic neighborhoods are more than twice as likely to have experienced pregnancy. This finding is consistent with prior literature suggesting that poor socioeconomic conditions and few professional/managerial workers in a neighborhood are associated with risk of adolescent pregnancy.^{8,51,52} However, previous studies have defined neighborhood environment solely based on census tract data while the current study elicited adolescent women's own perception of the quality of their neighborhood environments.

Although the present study cannot elucidate the mechanisms by which neighborhood environment affects sexual risk taking, and particularly history of pregnancy, current findings lend support to the Broken Windows theory,⁵³ which suggests that this association may be explained by the possibility that residents of chaotic neighborhoods may be more susceptible to the negative forces in their environment rather than positive forces. Specifically, as suggested by some authors, sexual risk behaviors that may ultimately place adolescents at heightened risk for pregnancy, may serve as temporary coping mechanisms against environmental and familial stress factors (i.e., absentee fathers), and may provide a temporary sense of acceptance and cohesion in an environment that may otherwise be perceived as chaotic and unstable.^{54,55}

Limitations

Several limitations to this study need to be acknowledged. First, the generalizability of the findings is limited to (a) adolescents meeting the inclusion criteria for this study and (b) the three geographic regions of the county from which data were collected. Second, data included in the current analyses were obtained through self-report and may reflect social desirability bias. Third, due to the cross-sectional nature of the data, no conclusion can be drawn regarding cause-effect relationships among the variables. Lastly, no measure of length of father absence was available for analysis, which could have shed further light on the strength of its association with history of pregnancy.

CONCLUSION

Understanding family and environmental level factors associated with pregnancy among adolescent women with psychological disorders is crucial both in terms of

clinical practice and the design of pregnancy prevention programs. Adolescent medicine physicians should work collaboratively with mental health clinicians specialized in delivering psychological services to adolescent women and their families. Through appropriate screening and referrals to mental health providers, physicians can encourage active parental involvement in the routine health care of their adolescent patients. Providers should emphasize family relations and dynamics by encouraging fathers to remain in the family with their children when possible, unless doing so results in a highly conflictual or violent family environment.⁵⁶ Alternatively, quantity and quality of father involvement beyond divorce/separation should be further investigated and encouraged for non-resident fathers. Furthermore, the findings of this study suggest that pregnancy prevention and control efforts should be intensified in physically chaotic environments. To that end, adolescent-focused training of health care providers in urban community health centers may represent the most direct and effective route to reach this vulnerable population through direct medical and psychological care as well as through referrals to supportive community resources and collaboration with adolescent pregnancy prevention programs.

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REFERENCES

1. Centers for Disease Control and Prevention. Vital signs: teen pregnancy—United States, 1991–2009. *Morbidity and Mortality Weekly Report*. 2011; 60(13): 414–420.
2. Ventura SJ, Hamilton BE. *U.S. teenage birth rate resumes decline. MCHS data brief no. 58*. Hyattsville: US Department of Health and Human Services, Centers for Disease Control and Prevention; 2011.
3. United Nations. *Demographic Yearbook*. New York: United Nations; 2008.
4. Martin TJ, Hamilton BE, Sutton PD, et al. Births: final data for 2008. *National Vital Statistics Report*. 2010; 59(1).
5. Mathews TJ, MacDorman M.F. Infant mortality statistics from the 2006 period linked birth/infant death data set. *National Vital Statistics Report*. 2010; 58(17).
6. Manlove J, Terry E, Mincieli L, et al. Outcomes for children of teen mothers from kindergarten through adolescence. In: Hoffman S, Maynard R, eds. *Kids having kids*:

- economic costs and social consequences of teen pregnancy.* Washington: The Urban Institute Press; 2008.
7. Breheny M, Stephens C. Youth of disadvantage? The construction of teenage mothers in medical journals. *Culture, Health and Sexuality.* 2010; 12(3): 307–322.
 8. Leventhal T, Brooks-Gunn J. The neighborhoods they live in: the effects of neighborhood residence on child and adolescent outcomes. *Psych Bull.* 2000; 126(2): 309–337.
 9. Miller BC, Benson B, Galbraith KA. Family relationships and adolescent pregnancy risk: a research synthesis. *Dev Review.* 2001; 21: 1–38.
 10. Young T, Turner J, Denny G, et al. Examining external and internal poverty as antecedents of teen pregnancy. *Am J Health Beh.* 2004; 28(4): 361–373.
 11. Lammers C, Ireland M, Resnick M, et al. Influences on adolescents' decision to postpone onset of sexual intercourse: a survival analysis of virginity among youths aged 13 to 18 years. *J Adolesc Health.* 2000; 26(1): 42–48.
 12. Moore RM, Chase-Lansdale PL. Sexual intercourse and pregnancy among African American girls in high-poverty neighborhoods: the role of family and perceived community environment. *J Marr Fam.* 2001; 63: 1146–1157.
 13. Manlove J, Ikramullah E, Mincieli L, et al. Trends in sexual experience, contraceptive use, and teenage childbearing: 1992–2002. *J Adolesc Health.* 2009; 44: 413–423.
 14. Miller KS, Levin ML, Whitaker DJ, et al. Patterns of condom use among adolescents: the impact of mother–adolescent communication. *Am J Pub Health.* 1998; 88(10): 1542–1544.
 15. Scaramella LV, Conger RD, Simons RL, Whitbeck LB. Predicting risk for pregnancy by late adolescence: a social contextual perspective. *Dev Psych.* 1998; 34: 1233–1245.
 16. Dittus PJ, Jaccard J. Adolescents' perceptions of maternal disapproval of sex: relationship to sexual outcomes. *J Adolesc Health.* 2000; 26(4): 268–278.
 17. Vesely SK, Wyatt VH, Oman RF, et al. The potential protective effects of youth assets from adolescent sexual risk behaviors. *J Adolesc Health.* 2004; 34(5): 356–365.
 18. Hillis SD, Anda RF, Dube SR, et al. The protective effect of family strengths in childhood against adolescent pregnancy and its long-term psychosocial consequences. *The Permanente J.* 2010; 14(3): 18–27.
 19. Markham CM, Lormand D, Gloppen KM, et al. Connectedness as a predictor of sexual and reproductive health outcomes for youth. *J Adolesc Health.* 2010; 46: S23–S41.
 20. Katz KS, Rodan M, Milligan R, et al. Efficacy of a randomized cell phone-based counseling intervention in postponing subsequent pregnancy among teen mothers. *J Mater Child Health.* 2011. doi:10.1007/s10995-011-0860-3.
 21. Harding DJ. Counterfactual models of neighborhood effects: the effect of neighborhood poverty on dropping out and teenage pregnancy. *Am J Socio.* 2003; 109(3): 676–719.
 22. Klein JD. Adolescent pregnancy: current trends and issues. *Pediatrics.* 2005; 116: 281–286.
 23. Buston K, Williamson L, Hart G. Young women under 16 years with experience of sexual intercourse: who becomes pregnant? *J Epi Comm Health.* 2007; 61: 221–225.
 24. Santos MI, Rosario F. A score for assessing the risk of first-time adolescent pregnancy. *Fam Practice.* 2011; 28: 482–488.
 25. Ramrakha S, Caspi A, Dickson N, et al. Psychiatric disorders and risky sexual behaviour in young adulthood: cross sectional study in birth cohort. *British Med J.* 2000; 321: 263–266.
 26. Shrier LA, Harris SK, Sternberg M, et al. Associations of depression, self-esteem, and substance use with sexual risk among adolescents. *Prev Med.* 2001; 33: 179–189.
 27. Smith MD. HIV risk in adolescents with severe mental illness: literature review. *J Adolesc Health.* 2001; 29: 320–332.
 28. Kovacs M, Krol RS, Voti L. Early onset psychopathology and the risk of teenage pregnancy among clinically referred girls. *J Am Aca Child Adolesc Psychia.* 1994; 33(1): 106–113.
 29. Fergusson D, Woodward L. Mental health, educational and social role outcomes of adolescents with depression. *Arch Gen Psychia.* 2002; 59: 225–231.

30. Pedersen W, Mastekaasa A. Conduct disorder symptoms and subsequent pregnancy, child-birth and abortion: a population-based longitudinal study of adolescents. *J Adolesc.* 2011; 34(5): 1025–1033.
31. Donenberg GR, Pao M. Youths and HIV/AIDS: psychiatry's role in a changing epidemic. *J Am Ac Child Adolesc Psychia.* 2005; 44(8): 728–747.
32. Donenberg GR, Pao M. Understanding HIV/AIDS: psychosocial and psychiatric issues in youths. *Contemp Psychia.* 2003; 2: 1–8.
33. Wilson H, Donenberg G. Quality of parent communication about sex and its relationship to mentally ill adolescents' risky sexual behavior. *J Child Psych Psychia.* 2004; 45: 387–395.
34. Donenberg GR, Emerson E, Bryant FB, et al. Understanding AIDS-risk behavior among adolescents in psychiatric care: links to psychopathology and peer relationships. *J Am Ac Child Adolesc Psychia.* 2001; 40(6): 642–653.
35. Brown LK, Danovsky MB, Lourie KJ, et al. Adolescents with psychiatric and the risk of HIV. *J Am Acad Child & Adolesc Psychia.* 1997; 36(11): 1609–1617.
36. Schwab-Stone M, Shaffer D, Dulcan MK, et al. Criterion validity of the NIMH diagnostic interview schedule for children version 2.3 (DISC-2.3). *J Am Aca Child Adolesc Psychia.* 1996; 35: 878–888.
37. Shaffer D, Fisher P, Lucas C, et al. NIMH diagnostic interview schedule for children, version IV (NIMH DISC-IV): description, differences from previous versions, and reliability of some common diagnoses. *J Am Aca Child Adolesc Psychia.* 2008; 39: 28–38.
38. Garland AF, Hough RL, McCabe KM, et al. Prevalence of psychiatric disorders in youths across five sectors of care. *J Am Aca Child Adolesc Psychia.* 2001; 40: 409–418.
39. Brown LK, Hadley W, Stewart A, et al. Psychiatric disorders and sexual risk among adolescents in mental health treatment. *J Consult Clin Psych.* 2010; 78(4): 590–597.
40. Barnes HL, Olson DH. Parent–adolescent communication and the circumplex model. *Child Development.* 1985; 56(2): 438–448.
41. Oregon Social Learning Center. *Parental Monitoring and Supervision Constructs (technical reports)*. Eugene: Oregon Social Learning Center; 1990.
42. Tolan PH, Gorman-Smith D, Huesman LR, et al. Assessment of family relationship characteristics: a measure to explain risk for antisocial behavior and depression among urban youth. *Psych Assess.* 1997; 9(3): 212–223.
43. Crum RM, Lillie-Blanton M, Anthony JC. Neighborhood environment and opportunity to use cocaine and other drugs in late childhood and early adolescence. *Drug Alc Dep.* 1996; 43: 155–161.
44. Hosmer DW, Lemeshow SL. *Applied logistic regression*. New York: Wiley; 2000.
45. Thompson SJ, Bender KA, Lewis CM, et al. Runaway and pregnant: risk factors associated with pregnancy in a national sample of runaway/homeless female adolescents. *J Adolesc Health.* 2008; 43: 125–132.
46. Ellis BJ, Bates JE, Dodge KA, et al. Does father absence place daughters at special risk for early sexual activity and teenage pregnancy? *Child Development.* 2003; 74(3): 801–821.
47. Belsky J, Steinberg L, Draper P. Childhood experience, interpersonal development, and reproductive strategy: an evolutionary theory of socialization. *Child Development.* 1991; 62: 647–670.
48. Silverstein LB, Auerbach CF. Deconstructing the essential father. *Am Psych.* 1999; 54: 397–407.
49. Fergusson DM, Woodward LJ. Teenage pregnancy and female educational underachievement: a prospective study of a New Zealand birth cohort. *J Mar Fam.* 2000; 62: 147–161.
50. Maton KI, Teti DM, Corns KM, et al. Cultural specificity of support sources, correlates and contexts: three studies of African-American and Caucasian youth. *Am J Comm Psych.* 1996; 24(4): 551–587.
51. Crane J. The epidemic theory of ghettos and neighborhood effects on dropping out and teenage childbearing. *Am J Sociology.* 1992; 96: 1126–1159.

52. Brooks-Gunn J, Duncan GJ, Klebanov PK, et al. Do neighborhoods influence child and adolescent development? *Am J Sociology*. 1993; 99: 353–395.
53. Wilson JQ, Kelling GL. The police and neighborhood safety: broken windows. *Atlantic Monthly*. 1982; 127: 29–38.
54. Cohen D, Spear S, Scribener R, et al. “Broken windows” and the risk of gonorrhea. *Am J Pub Health*. 2000; 90: 230–236.
55. Cohen DA, Mason K, Bedimo A, et al. Neighborhood physical conditions and health. *Am J Pub Health*. 2003; 93(3): 467–472.
56. Amato P, Booth A. *A generation at risk: growing up in an era of family upheaval*. Cambridge: Harvard University Press; 1997.