ECOLOGICAL FACTORS ASSOCIATED WITH ADOLESCENT PREGNANCY: A REVIEW OF THE LITERATURE

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ABSTRACT

Adolescent pregnancy, the disproportionate number of births to unmarried adolescents, the potential disadvantages for both mothers and their children, and the commensurate costs to society have received the attention of researchers in a variety of disciplines. This article reviews and synthesizes the disparate literature on psychosocial factors associated with adolescent pregnancy using Bronfenbrenner's ecological model. Social influences within the macrosystem, mesosystem, and microsystem are examined. Policy and service delivery recommendations are offered.

Adolescents account for a third of all out-of-wedlock births per year nationwide (United States Department of Health and Human Services, 1995). Associated problems include the increased likelihood of deleterious consequences for both adolescent mothers and their children (e.g., McAnarney & Hendee, 1989) and the cost for society as a whole (Burt, 1986). Reflecting public concern, research on adolescent pregnancy prevention has been ongoing since the 1970s (see Chilman, 1980; Phipps-Yonas, 1980; Urberg, 1982, for reviews) across a variety of disciplines: child development, psychology, social work, sociology, family science, nursing, and medicine. Synthesizing these disparate approaches is a difficult task (Elster, McAnarney, & Lamb, 1983). However, Bronfenbrenner's (1979) ecological model can be employed to organize the salient contributing factors in adolescent pregnancy. Support for an ecological perspective has been provided indirectly in the early reviews of the literature (Chilman, 1980; Phipps-Yonas, 1980; Urberg, 1982) and by more recent multivariate analyses.

Adapted from the physical sciences to explain human behavior, "Bronfenbrenner's (1979) ecological model of human development . . . conceptualizes ecological space as operating on different levels of systems, each of which is incorporated within the next" (Franklin, 1988,

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p. 340). At the most basic interactional level is the *microsystem*, which is the pattern of activities, roles, and interpersonal relations experienced by the individual in a given setting. The *mesosystem* involves interactions among settings. The next level, the *exosystem*, includes settings that affect the individual but with which the individual does not interact directly (exosystem variables are not covered here, since there are so many other variables that have a more direct impact on adolescents). The *macrosystem* includes the cultural variables that influence the individual.

Bronfenbrenner's conceptualization of ecological systems has been used in theoretical formulations, as well as employed in empirical research. Variables have often been chosen to represent system levels depending on the social phenomenon under study, making it difficult to "test" the ecological model. Nevertheless, the model can be seen as a way to organize factors associated with complex social problems so that knowledge building can occur and intervention can be implemented at the appropriate system level.

In the present article, Bronfenbrenner's definitions and relevant literature guided decisions about the psychosocial variables belonging to each system. Studies involving a range of ecological factors were included, even those not typically identified with the ecological systems framework. Studies using a cognitive framework, in which adolescent sexual behavior is viewed from a decision-making perspective, were excluded (e.g., Jorgensen & Adams, 1988; Keith, McCreary, Collins, Smith, & Bernstein, 1991; Marsiglio, 1985; Nathanson & Becker, 1983; Rogel, Zuehlke, Peterson, Tobin-Richards, & Shelton, 1980; Urberg, 1982; White, 1984). Because historical context is an element of the macrosystem, studies published since 1980 were reviewed. Although a case could be built for using data on parental communication to determine which teens are likely to get pregnant, this was seen as an overly specific focus, and more general family functioning was included. Another criterion for exclusion of studies was a focus on sexual knowledge and attitudes (e.g., Evans, 1987; Morrison, 1989; Nadelson, Notman, & Gillon, 1980), including tests of the effectiveness of sex education (e.g., Ku, Sonenstein, & Pleck, 1989). The studies also needed to have used primarily adolescent (age 19 and under) or high school samples, rather than college-age populations. Additionally, only those studies based in the United States were included. For instance, Oz and Fine's (1988) study in Ontario, Canada, was excluded because Hechtman (1989) reported that the rate of pregnancy and abortion among adolescents in the United States was over double that of adolescents in Canada.

A discussion of ecological factors in each system level follows. The literature is then critiqued, and implications for intervention are discussed. Table 1 presents study designs, samples, and key results.

TABLE 1. ADOLESCENT PREGNANCY STUDIES

AUTHOR	DESIGN	SAMPLE	KEY RESULTS
Abrahamse, Morrison, & Waite (1988)	Nationally representative, longitudinal (2 years) comparison of those who became pregnant and those who did not	*N*=13,061	Predictive of premarital childbearing: problem behavior at school, low educational expectations, and for Anglos and Hispanics, but not for African-Americans, depressive tendencies.
Barnett, Papini, & Gbur (1991)	Nonrandomized comparison groups: pregnant and nonpregnant (all sexually active)	*N*=124; females recruited from health clinics and family planning programs	Following factors predicted pregnancy status: low SES, single-parent or parent-absent households, being married, lack of family strength and openness in communication, and nonuse of birth control. Although not in the final regression model, nonpregnant teens reported higher self-esteem and families as higher in cohesion, while pregnant teens reported families as higher in adaptability.
Barth, Schinke, & Maxwell (1983)	Nonrandomized comparison groups: parenting, pregnant and nonpregnant	*N*=185; females recruited from school-based parent programs and alternative high schools	Low social support and SES more predictive of distress than parenting status.
Evans (1987)	Nonrandomized comparison groups: nonsexually active, sexually active and not pregnant,and childbearers	*N*=45; recruited from a health maintenance organization, a family health center, a social service agency, and a health clinic	Nonsexually active perceived their fathers as being particularly against premarital sexual activity; the other two groups also reported their fathers as less approving than other significant people in their lives; positive associations were found between sexual activity and childbearing of adolescents and attitudes of mothers, teachers, and female friends.
Falk, Gispert, & Baucom (1981)	Nonrandomized comparison groups: pregnant, nonpregnant, and aborters	*N*=170; recruited from a hospital, school-based programs for pregnant teens, maternity homes and high schools	On a psychological profile, pregnant teens were both least sociable and socialized, had difficulty thinking for themselves and were concerned with how others see them. They were aware of their emotional needs and appeared to be attempting to meet these needs by having a baby. They saw life going well for themselves at the time of the pregnancy.

(Table 1 continues)

(Table 1 continued)

Hanson, Myers, & *Ginsburg (1987)*	Nationally representative, *longitudinal (2 years)* comparison of those who became pregnant and those who did not	*N*=10,000; *female high school* sophomores	SES not directly as important as *parental discipline and control*, parental educational expectations, and their own expectations.
Landry, Bertrand, Cherry, & Rice (1986)	Nonrandomized comparison groups: childbearers, nonpregnant contraceptors, and aborters	*N*=379; recruited from a charity hospital, a women's health clinic, and a teen family planning clinic	Childbearers were older, not working, less educated, more likely to have friends who were teen parents, and had a greater number of people living in the household. Aborters were more likely to have plans to go to college and were not as knowledgeable about sources of *birth control*.
Mayfield-Brown (1989)	National stratified random sample: mothers and nonmothers	*N*=3,832	Mothers less educated and less likely to rely on parental financial support since they were not as likely to be living at home. African-American mothers more likely to receive financial support and child care from families.
Morgan, Chapar, & *Fisher (1995)*	Nonrandomized comparison groups: pregnant and nonpregnant (all sexually active)	*N*=64; recruited from a *health* clinic (Anglo, middle-class)	No significant differences on *SES*, ethnicity, age, religious affiliation, family structure, substance abuse, stress, and individual variables (self-worth, locus of control); *significant* variables to emerge were earlier age at first intercourse and perceived influence of powerful others.
Olson & Worobey (1984)	Nonrandomized comparison groups: pregnant and nonpregnant	*N*=60; recruited from school-based programs for pregnant teens and high *school family life* education classes	The pregnant group was likely to have lower grade point averages, and to report less love, attention, and interdependence.
Ralph, Lochman, & Thomas (1984)	Nonrandomized comparison groups: pregnant and nonpregnant	*N*=39; recruited from an adolescent health clinic	Pregnant teens had less defined and optimistic vocational goals, a mother with less education, greater security with home and family-related roles, later sex education, and more brothers in the home.

(Table 1 continues)

MACROSYSTEM

At the macrosystem level, socioeconomic status (SES) has been measured several ways, including mother's educational level (e.g., Ralph, Lochman, & Thomas, 1984), father's educational level (e.g., Yamaguchi & Kandel, 1987), parental occupation (Ralph, Lochman, & Thomas, 1984), and various combinations of these. For instance, Robbins, Kaplan, and Martin (1985) relied on mother's education, father's education, father's occupation, and respondent's subjective rating of

(Table 1 continued)

Robbins, Kaplan, & Martin (1985)	Geographically representative, longitudinal (10 years) comparison of those who were pregnant or responsible for a pregnancy and those not pregnant or not responsible for a pregnancy	*N*=2,158; males and females	Males who impregnated partners had the following characteristics: low SES, school problems, and high popularity. For females, pregnancy was associated with low SES, single-parent families, high number of siblings, school problems, family stress, and popularity.
Romig & Bakken (1990)	Nonrandomized comparison groups: nonpregnant and pregnant and/or parenting	*N*=99; recruited from a maternity home and other unspecified settings	Pregnant teens reported their families as less adaptable.
Scott-Jones & Turner (1990)	Nationally representative survey comparing adolescent and adult childbearers	*N*=2,230; all African-American subsample	SES was not a predictor of childbearing age; adolescent childbearers had less education.
Shah & Zelnik (1981)	National probability sample comparing those who have been pregnant and those who have not	*N*=2,193	Pregnancy was more likely for those whose views on sexuality more closely resembled their peers than their parents.
Vernon, Green, & Frothingham (1983)	Nonrandomized, longitudinal (1 year) comparison of those who became pregnant and those who did not	*N*=874	Self-esteem was not found to be a significant predictor. A discriminant function analysis revealed that no combination of variables (e.g., age, ethnicity, religious participation, peer influence) identified at-risk adolescents.
Yamaguchi & Kandel (1987)	Geographically representative, longitudinal (9 years) comparison of those who became pregnant and those who did not	*N*=706	Pregnancy status was predicted by ethnicity, illicit drug use other than marijuana, dropping out of school, and high peer activity.

family social class in measuring SES. Researchers who have found SES to be significant in adolescent pregnancy include Barnett, Papini, and Gbur (1991) and Robbins et al. (1985).

Many studies used samples that were explicitly low SES (Evans, 1987; Scott-Jones & Turner, 1990); other samples were assumed to be low SES due to their being drawn from health clinic populations (Barnett et al., 1991; Ralph, Lochman, & Thomas, 1984). Not surprisingly, nationally representative samples span SES levels (e.g., Abrahamse et al., 1988; Hanson et al., 1987; Shah & Zelnik, 1981), although some national surveys have focused on low-SES subsamples (Mayfield-Brown, 1989; Scott-Jones & Turner, 1990).

The many potentially deleterious consequences of adolescent pregnancy, such as truncated education, single-parent status, and reduced employment opportunities and income, are also correlated with low

SES (e.g., Furstenberg, Brooks-Gunn, & Morgan, 1987; Zuckerman, Alpert, Dooling, Hingson, Kayne, Morelock, & Oppenheimer, 1983). For those from low-SES homes, these consequences may lose their cost implications (Balassone, 1991), particularly if sanctions against pregnancy are lacking in the community and more acceptable ways to achieve adult status are not available. In addition, "the probability of reduced life chances leads many youth to engage in behavior that further compromises their chances of success" (Furstenberg et al., 1987, p. 151).

Racial differences in adolescent sexual behavior may be mainly attributable to SES (e.g., Bingham, Miller, & Adams, 1990). For instance, African-American adolescents residing in disadvantaged areas are more likely to initiate sexual intercourse than are their counterparts not living in these areas (Hogan & Kitagawa, 1985). Further, ethnic differences in sexual initiation disappear when African-American and Anglo adolescents attend integrated schools (Furstenberg et al., 1987).

Research has often focused on urban, low-SES African-Americans. Indeed, many studies have investigated almost entirely African-American populations (Evans, 1987; Falk et al., 1981; Landry et al., 1986; Ralph et al., 1984; Scott-Jones & Turner, 1990; Vernon et al., 1983). A problem with this focus is that nonurban African-Americans and adolescent childbearers in other ethnic groups from both rural and urban settings are understudied.

Ethnic differences may be attributable to structural and subcultural factors. Structural factors have been posited as contributing to the lack of financial support provided by African-American males to their partners (Marsiglio, 1989). Particularly in urban areas, demographic changes and the decline of the manufacturing sector have resulted in fewer employment opportunities (Williams, 1991). Murry (1992) has noted that early childbearing may be seen as a form of gratification when other roles are not perceived as options. Williams (1991) has pointed out that teenage mothers, in general, already come from poor households; "thus, it is unlikely that they see having a baby as leading to negative economic consequences" (p. 33).

The subcultural view argues that family-related values, attitudes, and norms account for different adolescent pregnancy rates in the African-American and mainstream Anglo culture. Franklin (1988) has stated that children are more highly valued by African-Americans for both intrinsic and instrumental reasons. Subcultural factors discussed by Murry (1992) include community and peer group acceptance of early sexual behavior and childbearing, the influence of maternal and sister sexual activity, and growing up in, and greater acceptance of, large families.

Structural and subcultural explanations can be combined. For example, segregation of improverished neighborhoods may result in a less conservative climate regarding sexual attitudes and behaviors (Marsiglio, 1989).

Adolescent parenting and pregnancy in Hispanic populations have received less attention as compared with Anglos or African-Americans. Psychosocial explanations similar to those posited for African-American/Anglo differences have been offered for Hispanics. Subcultural determinants include cultural characteristics, such as traditional values and the status accorded marriage and motherhood. Structural determinants include social characteristics, such as the overrepresentation of Mexican-Americans in the lower socioeconomic statuses (Jorgensen & Adams, 1988).

It is also recognized that there are differences in sexual behaviors and fertility between Hispanic subgroups. Stroup-Benham and Trevino (1991) found that Mexican-Americans, as compared with Puerto Ricans and Cubans living in the United States, had a higher adolescent fertility rate, but that Puerto Ricans had the highest rate of out-of-wedlock childbearing.

Acculturation is also a factor in adolescent pregnancy. Using a low-SES Mexican-American sample, Becerra and de Anda (1984) found that acculturated, English-speaking teenagers were more likely to be pregnant with a first or second child than were Spanish-speaking teenagers. Differences were hypothesized to be the result of weaker family control and looser family structure among the more acculturated.

MESOSYSTEM

Education

Although education can be categorized in the microsystem if viewed in terms of intellectual functioning, it can also be associated with the mesosystem. Santelli and Beilensen (1992) have stated that "positive school experiences may result from the availability of personal, family, or other social resources that also protect the adolescent from a pregnancy. Higher SES and higher educational goals are related; better educated parents tend to have greater incomes" (p. 273).

Education is a frequently examined variable in the pregnancy prevention literature. Aspects include educational (grade) level (Ralph et al., 1984), educational achievement (Olson & Worobey, 1984; Yamaguchi & Kandel, 1987), educational expectations (Abrahamse et al., 1988; Hanson et al., 1987), school conduct problems (Abrahamse et al.,

1988), attitudes toward school (Landry et al., 1986), and school stress (e.g., desire to leave school, perception that student is disliked by teacher).

Landry et al. (1986) explored a combination of educational variables with a sample of African-American adolescent females: childbearers, contraceptors who had never been pregnant, and aborters. Childbearers possessed the least amount of education, while aborters were more likely to have college plans. However, attitudes toward school, self-reports of grades, and plans to graduate from high school did not discriminate among the three groups. These latter results differed from other findings, which have consistently shown that poorer performance on educational indices is associated with higher risk for pregnancy and childbearing (Abrahamse et al., 1988; Hanson et al., 1987; Olson & Worobey, 1984; Ralph et al., 1984; Yamaguchi & Kandel, 1987).

This trend held up regardless of study design or sampling procedure, whether nonrandomized clinic samples, nationally or geographically representative data, or longitudinal research. For example, a two-year longitudinal study of 10,000 nationally representative female high school sophomores (Hanson et al., 1987) revealed that educational aspirations and good behavior at school acted as protective factors against pregnancy. Conversely, negative scholastic experiences (in terms of completion, achievement, and aspirations) have been found to be risk factors for sexual behavior and pregnancy, which serve as alternative sources of rewards and identity (Santelli & Beilensen, 1992). In addition, educational level and expectations are related to the desirability of children and the maternal role. Education is also associated with knowledge of contraceptive methods and fertility regulation.

Family

Family variables at the mesosystem level include family structure (e.g., Hanson et al., 1987; Landry et al., 1986; Ralph et al., 1984) and family functioning (e.g., Barnett et al., 1991; Romig & Bakken, 1990). In terms of structure, growing up in a single-parent family seems to put the adolescent at risk for early pregnancy (Robbins et al., 1985). Robbins et al. offered two possible explanations. The first is that adolescent females in single-parent households may have more responsibility for other children, and they become socialized into a maternal role. An alternative hypothesis is that female adolescents may especially need their fathers for guidance, discipline, and control. Interestingly, studies that have examined the effect of family structure on sexual activity, rather than pregnancy, have found that males tend to be more affected by the single-parent arrangement than are females

(Newcomer & Udry, 1985; Stern, Northman, & Van Slyck, 1984; Young et al., 1991). Further, it must be noted that family structure tends to be correlated with other factors, such as low SES (e.g., McAnarney & Hendee, 1989); therefore, SES and family structure effects may be confounded. For example, using a predominantly Anglo, middle-class sample, Morgan, Chapar, and Fisher (1995) found no significant effects for family structure.

Various aspects of family functioning have also been tapped: attitudes of parents toward adolescent sexuality (Evans, 1987; Shah & Zelnik, 1981), family strengths (Barnett et al., 1991), family conflict (Barth et al., 1983), family stress (Robbins et al., 1985), parental control and monitoring (Hanson et al., 1987), and family adaptability and cohesion (Barnett et al., 1991; Romig & Bakken, 1990). Romig and Bakken (1990) found that cohesion did not discriminate between parenting, pregnant, and never-pregnant adolescents. However, family adaptability did; pregnant teens reported their families as being less adaptable (more rigid). While rigid families may contribute to pregnancy, it may also be that during the crisis of pregnancy, families seem more rigid. After the birth, they might become more adaptable in order to cope with a new baby in the family.

Barnett et al. (1991) found different results in a sample of pregnant and nonpregnant adolescents, all of whom were sexually active. While perceived adaptability and cohesion of families did not enter the final regression model, nonpregnant adolescents perceived their families as higher in cohesion, and pregnant adolescents perceived their families as higher in adaptability. The researchers hypothesized that a lack of cohesion or emotional connection may lead to feelings of social and emotional isolation, which in turn may contribute to an adolescent engaging in sexual activity to fill the void.

Related to the construct of adaptability is parental control, such as monitoring homework and social activities, which was found to be a significant factor in a nationally representative two-year longitudinal study of adolescent pregnancy (Hanson et al., 1987). Robbins et al. (1985) found greater gender differences in terms of emotional connection, and family stress was related to increased pregnancy risk.

It is assumed that adolescents are influenced by their family's religious affiliation and commitment. However, religion has not often emerged as a significant discriminator of pregnancy status, unless placed in the broader context of commitment to conventional values and institutions (Yamaguchi & Kandel, 1987; see also Morgan et al., 1995; Romig & Bakken, 1990).

Peers

Examples of peer variables in the pregnancy prevention literature include peer educational aspirations (Hanson et al., 1987), involvement with peers (Yamaguchi & Kandel, 1987), perception of pressure from male partners, and attitudes of peers toward adolescent sexual behavior (Evans, 1987; Shah & Zelnik, 1981). Evans' (1987) study of low-SES African-American females (ages 16 to 17), which compared childbearers, those who were not sexually active, and those who were sexually active but not pregnant, revealed that liberal peer sexual attitudes are positively correlated with pregnancy/parenting status. Liberal attitudes of peers could have contributed to the adolescent's sexual behavior; alternatively, the adolescent may have perceived friends' attitudes as similar to her own in order to rationalize her behavior.

In regard to sexuality, Shah and Zelnik (1981) found that young women with values resembling those of their friends (rather than parents) were at higher risk for pregnancy. Hanson et al. (1987) examined the impact of peer and family variables and found that individual aspirations and family influence were more salient than peer educational aspirations in determining pregnancy status. A nine-year longitudinal study involving a geographically representative, stratified sample discovered that teens with poor family relationships were at risk for heavier involvement with negative peers, which in turn may position the peer group as the more powerful influence on behavior (Yamaguchi & Kandel, 1987).

Social Support

The mediating effects of social support have been investigated for a number of health issues (e.g., Cohen & Wills, 1985), including pregnancy outcomes, such as low infant birth weight (Oakley, 1985). Given adolescents' relatively undeveloped psychological, financial, and educational resources, social support can be especially beneficial, particularly for those with children (Barth & Schinke, 1983; Causby, Nixon, & Bright, 1991; Culp, Appelbaum, Osofsky, & Levy, 1988; de Anda, 1983; Dunst, Vance, & Cooper, 1986; Giblin, Poland, & Sachs, 1987; McKenry, Kotch, & Browne, 1991; Parish, Hao, & Hogan, 1991; Reis & Herz, 1987; Schilmoeller & Baranowski, 1985; Schilmoeller et al., 1991; Turner, Grindstaff, & Phillips, 1990).

Barth, Schinke, and Maxwell (1983), examining parenting, pregnant, and nonpregnant adolescents recruited from school-based parent programs and alternative high schools, found that low social support and SES predicted maladjustment more than did parenting status. Both pregnant and parenting teens were found to have higher levels

of social support compared with the nonpregnant teens. Although pregnant teens had the most social support, the mediating effects of social support on distress were highest for the parent group.

In contrast, no significant differences in stressful life events were found between pregnant and nonpregnant groups in a middle-class, mostly Anglo sample of sexually active adolescent females (Morgan, Chapar, & Fisher, 1995). Another study, examining differences in social support between adolescent parents and their nonparenting counterparts, revealed that adolescent mothers were less likely to rely on parental financial support since they were not as likely to be living at home (Mayfield-Brown, 1989). Ethnic differences also emerged, with African-American mothers more likely to receive financial and child care support from their families than were Anglo mothers.

MICROSYSTEM

At the microsystem level, it is not surprising that older age is associated with increased likelihood of pregnancy and parenting (Landry et al., 1986; Mayfield-Brown, 1989). Many studies have also included psychological variables, particularly self-esteem (e.g., Barnett et al., 1991; Barth, Schinke, & Maxwell, 1983; Falk et al., 1981; Morgan et al., 1995; Ralph et al., 1984; Robbins et al., 1985; Vernon, Green, & Frothingham, 1983). Barnett et al. (1991) found that low self-esteem was significantly correlated with pregnancy. Vernon et al. (1983), however, did not find a relationship between self-esteem and pregnancy in their sample of mainly African-American females. African-American females reportedly have higher self-esteem as compared with their Anglo counterparts, a finding that was replicated by Robbins et al. (1985). Indeed, these researchers proposed that adolescents with low self-esteem may be *less* at risk for pregnancy.

CRITIQUE

The quality of research has clearly improved since the 1970s (Flick, 1986). Designs have become more stringent, with inclusion of nationally representative, longitudinal survey data (Abrahamse et al., 1988; Hanson et al., 1987; Mayfield-Brown, 1989; Shah & Zelnik, 1981), stratified sampling of low-income youth (Scott-Jones & Turner, 1990), and geographically representative, longitudinal comparisons (Robbins, Kaplan, & Martin, 1985; Vernon, Green, & Frothingham, 1983; Yama-

guchi & Kandel, 1987). Nevertheless, the most common designs involved nonrandomized samples, mainly obtained from clinics but also school populations (Barnett, Papini, & Gbur, 1991; Barth, Schinke, & Maxwell, 1983; Evans, 1987; Falk et al., 1981; Landry et al., 1986; Morgan, Chapar, & Fisher, 1995; Olson & Worobey, 1984; Ralph, Lochman, & Thomas, 1984; Romig & Bakken, 1990). The nonrandomized designs usually included pregnant versus nonpregnant comparisons (Olson & Worobey, 1984; Ralph, Lochman, & Thomas, 1984), with the entire nonpregnant group being sexually active as one variation (Barnett et al., 1991; Morgan et al., 1995). Other comparison groups have included sexually active and nonsexually active adolescents and those with children (Evans, 1987), as well as parenting, pregnant, and never-pregnant adolescents (Barth, Schinke, & Maxwell, 1983; Romig & Bakken, 1990). Less common are studies investigating aborters. For example, Landry et al. (1986) compared aborters with both childbearers and contraceptors who have never been pregnant. Falk, Gispert, and Baucom (1981) compared pregnant teens who planned to give birth, those who had applied for abortions, and teens who were not pregnant.

There are several limitations to using clinic samples: subjects are often low SES, African-American, and possess low educational achievement and aspirations (DeBolt et al., 1990). However, the availability of subjects of a given pregnancy status and obtaining agency cooperation (Marsiglio & Menaghan, 1990; Miller et al., 1987) and informed consent from both adolescents and parents are factors that make it difficult to attain random samples (Cervera, 1991; Ralph et al., 1984). Populations that tend to be missing from research include middle-class and nonurban adolescents.

Another limitation in the area of adolescent pregnancy is that studies tend to be atheoretically driven. Exceptions include research by Mayfield-Brown (1989), which examined role transition to adulthood. A further limitation is reliance on cross-sectional and retrospective data, rather than prospective, longitudinal research (Robbins et al., 1985). An obvious problem with cross-sectional research is that predictor variables "cannot be interpreted as causal factors because directionality cannot be established" (Barnett et al., 1991, p. 467). Ideally, researchers could follow a cohort of representative teens prospectively. However, there are many difficulties associated with longitudinal designs, such as expense, sample recruitment, cooperation, and attrition.

IMPLICATIONS

In terms of policy and service delivery for the prevention of teenage pregnancy, it is recommended that interventions be aimed at broader

systems (macro and meso) rather than the current focus on individuals' knowledge (i.e., the emphasis on sex education). While important, knowledge in itself tends not to be highly correlated with behavior (Zelnik & Kim, 1982). A meta-analysis of pregnancy prevention outcome studies also found that knowledge-based sex education programs were relatively ineffective in delaying sexual initiation and in improving contraceptive rates (Franklin, Grant, Corcoran, O'Dell, & Bultman, 1997). Other researchers applying ecological systems theory, as explicated by Bronfenbrenner, have also discussed the limitations of individual-focused interventions (e.g., McLeroy et al., 1988).

Since low income has been found to predict pregnancy/parenting status, macrosystem-level intervention involving educational policy is warranted. Lack of academic inclination or performance may limit employment opportunities and income, and for those who are not academically inclined, alternative programs could be implemented so that they are prepared to earn a living when they graduate from high school. Academic instruction related to vocational training may have more relevance for such students. For example, math skills might be more easily acquired in the context of bookkeeping. Science and math instruction might be integrated into the mechanical trades. Government and business can be enlisted in such efforts. For example, a health clinic could train teens in medical technology while providing instruction in health, nutrition, and child development. In this way, adolescents would not only acquire skills and knowledge, they would also be exposed to role models and the realities of the work environment. Such adolescents would be less likely to jeopardize their future by becoming pregnant, and if they did have children, to be better prepared to provide financially for them.

Another recommendation is to direct efforts toward improving family functioning rather than just communication about sexual matters. More convenient, low-cost counseling may encourage more families to participate. Family and school problems are often related, and making counseling services available after school hours might also increase parental involvement. Finally, such services must be available even before adolescence, since efforts to prevent pregnancy need to start early.

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