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:TITLE: Clinical psychology review.
:IMPRINT: New York : Pergamon Press, c1981-
:ARTICLE: Kotchick, Beth A. ; Shaffer, Anne ; Forehand, Rex: Adolescent sexual risk behavior: A multi-system perspective.
:VOL: 21 :NO: 4 :DATE: June 2001 :PAGES: 493-519
:VERIFIED: <TN:26393>OCLC ISSN: 0272-7358 [Format: Serial]
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Clinical Psychology Review, Vol. 21, No. 4, pp. 493–519, 2001
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0272-7358/01/$–see front matter

Pergamon

PII S0272-7358(99)00070-7

ADOLESCENT SEXUAL RISK BEHAVIOR: A MULTI-SYSTEM PERSPECTIVE

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ABSTRACT. *Adolescents are at high risk for a number of negative health consequences associated with early and unsafe sexual activity, including infection with human immunodeficiency virus, other sexually transmitted diseases, and unintended pregnancy. As a result, researchers have attempted to identify those factors that influence adolescent sexual risk behavior so that meaningful prevention and intervention programs may be developed. We propose that research efforts so far have been hampered by the adoption of models and perspectives that are narrow and do not adequately capture the complexity associated with the adolescent sexual experience. In this article, we review the recent literature (i.e., 1990–1999) pertaining to the correlates of adolescent sexual risk-taking, and organize the findings into a multisystemic perspective. Factors from the self, family, and extrafamilial systems of influence are discussed. We also consider several methodological problems that limit the literature's current scope, and consider implications of the adoption of a multisystemic framework for future research endeavors. We conclude with a discussion of the implications of the available research for practitioners working to reduce sexual risk behavior among adolescents.* © *2001 Elsevier Science Ltd. All rights reserved.*

KEY WORDS. Adolescents, Sexual risk behavior, Multisystemic.

IN RECENT YEARS, professional and public attention has been directed to the numerous health risks of unsafe sexual behavior. Adolescents, in particular, have been found to be at high risk for many negative health consequences related to sexual risk-taking behavior, including infection with human immunodeficiency virus (HIV), other sexually transmitted diseases (e.g., syphilis, chlamydia), and the

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occurrence of unintended pregnancy (Aggleton, 1995; Department of Health and Human Services, 1990, 1997; Kegeles, Adler, & Irwin, 1989).

As the risks associated with adolescent sexual risk behavior continue to mount, increased research efforts have been dedicated to the examination of the psychosocial context in which sexual initiation and sexual risk-taking behavior occur (Bluestein & Starling, 1994; Gardner & Wilcox, 1993; Rosenberg, Biggar, & Goedert, 1994). While substantial progress has been made in identifying the precursors and consequences of risky adolescent sexual behavior, two major limitations exist within this area of research that hamper efforts to translate the findings into effective prevention and education programs. First, the literature lacks a consistent and thorough conceptual framework by which to frame our understanding of adolescent sexual behavior, particularly risk behavior. Without such a synthesis, the extant literature does not provide the comprehensive understanding of adolescent sexual risk behavior that is necessary for the creation of future risk-reduction efforts and evaluation of current prevention programs. Second, the design of most research studies that attempt to identify the factors associated with adolescent sexual risk behavior is plagued by methodological "pitfalls" that complicate efforts to accurately interpret the findings.

This review will examine adolescent sexual risk behavior, its associated risks to health and well-being, and the factors related to the promotion of sexual risk-taking and risk-reduction practices. Our overarching purpose is to present the available research within a conceptual framework that we call a multisystemic perspective, while also considering the methodological limitations of the studies reviewed. Thus, the specific goals of this review are the following: First, we present an overview of sexual activity and risky sexual practices among American youth. Second, we offer a multisystemic conceptual model that organizes the available findings into a useful framework for both understanding and preventing adolescent risk behavior. Third, we summarize findings on the factors associated with sexual risk behavior from recent research (i.e., published since 1990). Fourth, we discuss some of the methodological limitations inherent in research pertaining to adolescent sexual behavior. And finally, we suggest guidelines for future research and the development of sensitive and efficacious prevention programs.

ADOLESCENT SEXUAL RISK-TAKING: SOBERING STATISTICS

Consistent data across a number of national surveys indicate that sexual activity among American adolescents has increased dramatically over the past two decades. According to the 1997 Youth Risk Behavior Survey data, nearly one half of high school students have engaged in sexual intercourse prior to graduation (Kann et al., 1998). Estimates appear to be higher for males, minority adolescents, and adolescents of lower socioeconomic status (Kann et al., 1998; Kann et al., 1995; Leigh, Morrison, Trocki, & Temple, 1994; Seidman & Reider, 1994). For example, 89% of Black male high school students and 70% of Black female high school students report having engaged in sexual intercourse; comparable rates for Caucasian male and female students are 49% and 47%, respectively (Kann et al., 1995). National survey data also reveal that a considerable proportion of teenagers are initiating sexual activity by early or middle adolescence, with 21% of adolescent males having engaged in sexual intercourse by age 15 (Sonenstein,

Pleck, & Ku, 1991), and 7.2% of students having had sexual intercourse before the age of 13 (Kann et al., 1998). Early initiation of sexual activity appears to be more prevalent among adolescents of ethnic minorities; Black and Hispanic teens tend to report higher rates of sexual involvement at younger ages than their Caucasian peers (Kann et al., 1998; Christopher, Johnson, & Roosa, 1993; Leigh et al., 1994; Romer et al., 1994; Seidman & Reider, 1994; Sonenstein et al., 1991; Stanton et al., 1994).

Considering the rate of sexual activity among adolescents, it is alarming that many sexually active teenagers engage in behaviors that are considered risky or unsafe and which may expose them to HIV/AIDS, other sexually transmitted diseases, or unintended pregnancy. For example, recent national data indicate that 24.7% of sexually active students used alcohol or drugs at the time of their most recent sexual experience (Kann et al., 1998). Of serious concern is the frequent finding that only a small proportion (i.e., approximately 10–20%) of sexually active adolescents use condoms consistently (DiClemente et al., 1992; Kann et al., 1995; Seidman & Reider, 1994). The consistent use of condoms appears to be lower for minority adolescents than for Caucasian adolescents (Airhihenbuwa, DiClemente, Wingood, & Lowe, 1992; Brown, DiClemente, & Park, 1992; Mora, 1992). Furthermore, adolescents tend to engage in sexual activities in the context of serial monogamous sexual relationships that are of short duration, increasing their exposure to multiple sexual partners and, subsequently, their risk of HIV infection and other negative consequences of sexual risk-taking behavior (Overby & Kegeles, 1994).

Sexual risk-taking behaviors, such as inconsistent condom use and sex with multiple partners, has already had devastating effects on the health of American adolescents. Recent surveillance data indicate that over 3400 cases of AIDS have been diagnosed in the United States among persons between 13 and 19 years of age, with another 4159 cases of HIV infection within this age bracket being reported from states with confidential HIV infection reporting (Kann et al., 1998). Because HIV has a median incubation period of approximately 10 years, a large proportion of adults diagnosed with AIDS in their 20s are thought to have become infected with HIV during their early adolescence (Chesney, 1994; Joseph, 1991). As such, many more adolescents are suspected to be unknowingly infected with HIV.

National data also reveal that 15–19-year-old adolescents have the highest rates of gonorrhea, syphilis, and chlamydia in the United States (Bowler, Sheon, D'Angelo, & Vermund, 1992; Department of Health and Human Services, 1990, 1997). Furthermore, the United States has one of the highest teenage pregnancy rates among Western industrialized countries (see Kirby et al., 1994) and the rates are rising among unmarried 14–16-year-old females (Bluestein & Starling, 1994). Statistics such as these underscore the fact that the consequences of adolescent sexual risk-taking behavior are of grave concern and are in immediate need of efforts to prevent their occurrence. To do so effectively, we need to identify and understand the factors that contribute to sexual risk behavior among American adolescents.

REVIEWING THE LITERATURE: A MULTISYSTEMIC PERSPECTIVE

Sexual risk behavior, like many other problematic behaviors of youth, has been studied for quite some time (see Brooks-Gunn & Furstenberg, 1989; Goodson,

Evans, & Edmundson, 1997; Miller & Moore, 1990, for earlier reviews). However, the research that has accumulated thus far still leaves several important issues unaddressed. First, most existing literature on adolescent sexuality has framed *all* sexual behavior among youth as being problematic; little empirical attention has been given to the developmental processes involved in becoming a healthy sexual adult. Second, until fairly recently, much of the empirical focus has been on self-oriented factors that relate to sexual behavior, with substantially less attention devoted to factors from the familial and social context. Third, although more recent research has expanded this focus to include personal, familial, social, and cultural factors that contribute to adolescent sexual risk-taking behavior, little effort has been made to integrate this literature into a conceptual framework that simultaneously considers multiple systems of influence and the complexity of their combined effects on adolescent behavior (see Resnick et al., 1997; Small & Luster, 1994, for exceptions). Finally, while earlier reviews have been written on the topic of the transition to sexual activity (e.g., Goodson et al., 1997), no attempt has been made to organize the recent findings as they pertain to adolescent sexual risk-taking behavior, such as inconsistent condom use or having multiple sexual partners.

In this review, we examine the literature on adolescent sexual risk behavior from a multisystemic perspective (see Fig. 1). Such an approach is guided by Bronfenbrenner's (1979, 1989) Ecological Systems Theory, which emphasizes the reciprocal relations among multiple systems of influence on a person's behavior. According to this perspective, an accurate and comprehensive understanding of adolescent sexual risk behavior must necessarily include some knowledge of both the personal and the environmental factors which may contribute to the decision to become

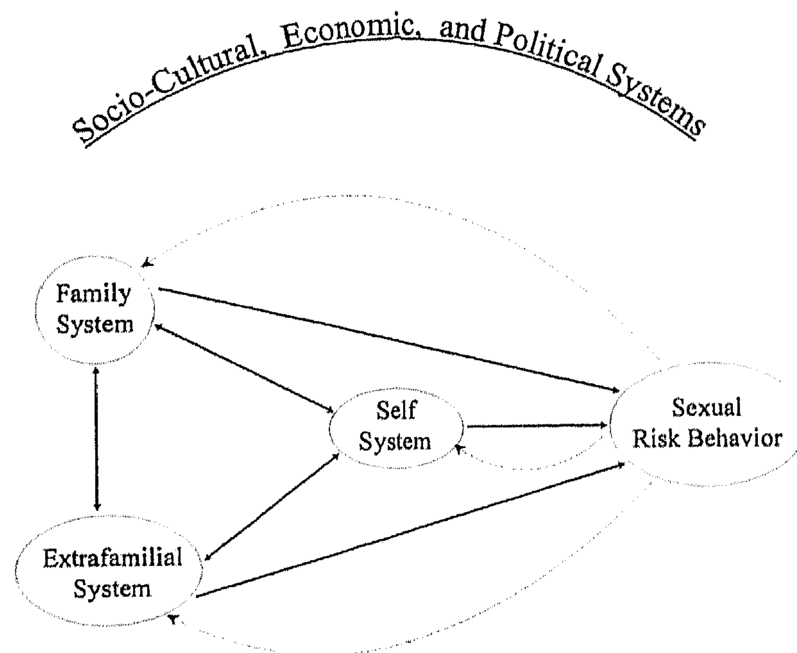

FIGURE 1. A Multisystemic Perspective on Adolescent Sexual Risk Behavior.

sexually active and, subsequently, the decision to engage in risk-promoting or risk-reducing sexual behaviors.

We focus our attention on three systems of influence believed to be primary contributors to adolescent sexual behavior: the self, family, and extrafamilial systems. Although we acknowledge that higher order systems, such as cultural, economic, or societal systems, may also exert influence on behavior, we believe the impact of such macrosystems permeates through micro-level systems, such as the self, family, and extrafamilial systems, to affect behavior (Bronfenbrenner, 1979).

The available literature has done little to understand how factors from multiple systems of influence interact or combine with each other to shape behavior. A multisystemic perspective would suggest that the relations among these systems are transactional and interactional, with each system exerting both direct and indirect effects on behavior. It is assumed that systems interact with each other, such that risks or resources from one serve to either potentiate or buffer against the effects of others, and that each system influences other systems as well as behavior itself. In this sense, one system may serve as a partial or full mediator of the effects of other systems or factors within other systems on behavior. In addition, according to our model, sexual behavior itself may also exert some influence on the self, family, and extrafamilial systems in a feedback mechanism that continually shapes and reshapes the relations among the systems.

This review is intended to serve as a "jumping-off" point for systematic research that may support or disconfirm these theoretical hypotheses. With statistical and measurement technology becoming increasingly refined (e.g., structural equation modeling), answers to these questions may not be far off in the future. With that end in mind, the following literature review will present a summary of the correlates of adolescent sexual risk behavior within the self, familial, and extrafamilial systems. At the end of the review, we present a brief discussion of the methodological strengths and weaknesses found in the literature and offer suggestions for improving the design of future research efforts that seek to predict or explain adolescent sexual risk-taking behavior.

LITERATURE SEARCH METHODS

In order to gather as many relevant articles for this review as possible, several search methods were employed. First, three on-line databases in the social and health sciences (PsycINFO, MEDLINE, and ERIC) were searched for publications dated between January 1990 and June 1999 using the following terms: *adolescent sexual behavior, adolescent sexual activity, adolescent sexuality*, and *adolescent risky sexual behavior*. These initial searches produced more than 500 articles; this number was significantly reduced after applying the following criteria for inclusion in this review: first, the participants in the reported study must have been under 18 years of age and from an English-speaking, U.S.-based sample; second, publications such as literature reviews, book chapters, theses and dissertations were excluded because they were either nonempirical in nature, had not been peer-reviewed, or could be difficult to obtain; third, the study had to include measures of adolescent sexual risk behavior as outcomes. For the purpose of this review, we define adolescent sexual risk behavior as inconsistent or non-use of condoms, inconsistent or non-use of other contraceptive methods, having multiple sexual partners, and the use of alcohol or drugs prior to or

in conjunction with participation in sexual activity.[1] These behaviors were selected as indexes of sexual risk behaviors because they are all well represented among the outcomes in the adolescent sexual behavior literature and clearly place adolescents at risk for negative sexual outcomes, such as infection with HIV or other sexually transmitted diseases and unintended pregnancy. Studies that examined only the health outcomes of risky sexual behavior, such as pregnancy or sexually transmitted disease (STD) infection, were also included in the review.

In addition to computer-assisted searches, articles that met the inclusion criteria were obtained through bibliographic reviews of the acquired articles, as well as from manual searches of relevant journals.

LITERATURE SEARCH RESULTS

The Self-system

The self-system refers to a constellation of factors, including qualities, skills, knowledge, attitudes, and behaviors, that belong to an individual person and which have either a direct or indirect influence on behavior. For the purpose of this review, the self-system variables will be divided into biological, psychological, and behavioral correlates of sexual risk practices.

Biological factors. Adolescent age, pubertal development, gender, and race are self-system variables that have been shown to relate to adolescent sexual risk behavior.[2]

Not surprisingly, older adolescents report more sexual activity and having more partners than do younger teens (e.g., Harvey & Spigner, 1995; Levy, Lampman, Handler, Flay, & Weeks, 1993; Miller, Forehand, & Kotchick, 2000; Orr, Beiter, & Ingersoll, 1991; Sonenstein et al., 1991). But how does age relate to sexual risk behaviors, such as inconsistent condom use? Our literature search yielded five studies that explicitly addressed this question. Four groups of researchers found that older age was associated with less consistent condom use in both minority and mixed race samples (Anderson et al., 1990; Pendergrast, DuRant, & Gaillard, 1992; Reitman et al., 1996; Shrier, Emans, Woods, & DuRant, 1996). A fifth study found that older females were more likely than younger females to use some form of birth control,

[1] In the adolescent sexual risk-taking literature, two other indices of "risk" are sometimes assessed, but are not included here. First, we do not consider a dichotomous measure of whether an adolescent is sexually active (i.e., ever had intercourse) to be the most sensitive assessment of adolescent sexual behavior. As Miller, Clark, Wendell et al. (1997) have shown, adolescent sexual activity exists as a continuum of behaviors, some riskier than others, and these differences are obscured by combining behavior into one category of sexually active vs. nonactive (see also Luster & Small, 1994). Similarly, the age at which an adolescents initiates sexual activity is not considered here as a risk behavior, as age alone is not completely indicative of risk. Instead, our review considers early sexual debut to be a risk factor for later sexual risk-taking, rather than a risk behavior in itself.

[2] We use the term *biological factors* to refer to physical characteristics with which adolescents are born and that are not modifiable by environmental forces. Our use of the term *race* in this context is intended to convey a biological attribute and not the sociocultural aspects of racial or ethnic identity.

while age was not associated with contraceptive use for males (Luster & Small, 1994). However, it is difficult to reconcile these conflicting results because Luster and Small (1994) did not measure condom use explicitly.

A variable inherently confounded with age is pubertal development. Early pubertal development has been found to relate to earlier ages of sexual debut for both males and females of minority and non-minority races (Capaldi, Crosby, & Stoolmiller, 1996; Miller, Norton, et al., 1997; Miller, Norton, Fan, & Christopherson, 1998; Resnick et al., 1997). However, only one study (Mezzich et al., 1997) was found that examined the effect of early pubertal timing (i.e., age at menarche) on adolescent sexual risk behavior. These authors found that age at menarche was strongly correlated with affiliation with an adult boyfriend and risky sexual behavior. However, they failed to find that age at menarche moderates the relation between having an older boyfriend and risky sexual behavior. Instead, they suggest that early menarche may be a risk factor for affiliating with older boyfriends, which, in turn, increases the chance of engaging in sexual risk behaviors among teen girls. In addition, Baumeister, Flores, and Marin (1995) found that, among Latina adolescents, later age at menarche was associated with *not* becoming pregnant in adolescence.

Although most studies of adolescent sexual behavior include both males and females in their samples, only nine in our literature review directly examined gender differences in sexual risk practices. All but one (Devine, Long, & Forehand, 1993) found an association between gender and sexual risk behavior, but the nature of the relationship varied by outcome measure. Adolescent boys reported having significantly more sexual partners than adolescent girls (Luster & Small, 1994; Tubman, Windle, & Windle, 1996) and to engage in higher levels of sexual risk behavior when both number of partners and condom use are considered jointly (Dutra, Miller, & Forehand, 1999; Reitman et al., 1996). However, when use of condoms was assessed alone, adolescent girls tended to report less frequent use of condoms with their sexual partners than boys (Brown et al., 1992; Cooper, Peirce, & Huselid, 1994; Romer et al., 1994; Shrier et al., 1996). Thus, the literature suggests that both genders appear to be at risk for engaging in sexual risk-taking behaviors: adolescent boys tend to have more sexual partners, while girls are less likely to report consistent condom use with their partners.

Race is another biological variable found to be associated with patterns of adolescent sexual activity (e.g., Kann et al., 1998; Leigh et al., 1994). Despite national surveys that suggest sexual activity is higher for minority youth than for Caucasian youth (e.g., Kann et al., 1998; Kann et al., 1995), it is difficult to draw reliable conclusions about differences in sexual risk-taking behavior among racial groups. The results of studies that find such differences often depend on the racial groups being compared and the risk behaviors being considered. For example, some researchers have found that White adolescents appear to use condoms less consistently than other groups (Cooper et al., 1994). However, Black adolescents reported higher levels of risk behavior (an index that considered both number of partners and condom use) than Latina youth (Dutra et al., 1999), and Black female adolescents were more likely to report having multiple partners than White or Latina adolescents in a sample of teenagers who were either currently pregnant or had already borne children (Koniak-Griffin & Brecht, 1995). In the only study to include Asian adolescents, Hou and Basen-Engquist (1997) found that Asian–Pacific Islander youth were more likely to have multiple sexual partners but less likely to report having used alcohol or drugs prior to sexual intercourse than their

White peers. Finally, a higher incidence of teenage pregnancy was found among Mexican American and Native American women than African American or non-Hispanic White women (Roosa, Tein, Reinholtz, & Angelini, 1997). Unfortunately, Roosa et al. (1997) did not control for socioeconomic status (SES) differences among racial groups that may account for the observed differences. Indeed, observed racial differences in many sexual risk practices may be confounded by other demographic factors, such as education, SES, and access to health care or family-planning agencies.

Racial differences in risk-reduction strategies, such as condom use, have also been observed to vary by gender. Cooper et al. (1994) compared White and Black males and females and found that White females were the least likely to report use of condoms by their male partners. Similarly, being White and male was associated with more consistent condom use in a sample of multiple racial groups (Brown et al., 1992), though data for each racial group was not presented. Both race and gender have multiple psychosocial correlates that may account for these differences, including SES, education, experience of sexual coercion, and cultural expectations for male and female sexual behavior (Airhihenbuwa et al., 1992; Biglan, Noell, Ochs, Smolkowski, & Metzler, 1995).

Psychological factors. We turn our attention now to the studies that have examined the role of psychological variables in the development of adolescent sexual risk-taking behavior. Cognitive competence, as measured by academic performance, is a psychological variable that has occupied a prominent position in the prediction of adolescent involvement in sexual activity (e.g., East, 1998; Jessor, Van Den Bos, Vanderryn, Costa, & Turbin, 1995; Perkins, Luster, Villarruel, & Small, 1998; Small & Luster, 1994). However, only three studies in the literature we reviewed have directly examined the association between academic performance and sexual risk-taking practices among adolescents. In a sample of high-risk youth, Hardy and colleagues found that adolescents who became pregnant had lower grade-point averages (GPAs) and IQ scores than their peers who delayed pregnancy until their 20s (Hardy, Astone, Brooks-Gunn, Shapiro, & Miller, 1998). Luster and Small (1994) found that GPA significantly predicted sexual risk status (based on number of partners and condom use), with lower-risk and sexually abstinent youth reporting higher GPAs than high-risk teens. In the one of the only prospective studies in this area, Scaramella, Conger, Simons, and Whitbeck (1998) found that 8th grade GPA was a significant predictor of whether an adolescent reported experiencing a pregnancy by the 12th grade.

Self-efficacy, or the belief that one has the ability to perform a particular action effectively (Bandura, 1977), has been a central concept in social-cognitive theories of HIV prevention in general (see Herlocher, Hoff, & DeCarlo, 1995, for a review of HIV prevention theories). However, relatively little research examines the role of self-efficacy in promoting safer sexual practices among adolescents. Reitman et al. (1996) found that adolescents believing they could take "effective precautionary action to avoid HIV" had fewer sexual partners and reported more condom use than their peers who had lower self-efficacy scores. General and AIDS-specific self-efficacy, as well as the more global construct of self-esteem, was found to relate to more condom use within a sample of high-risk female minority adolescents (Overby & Kegeles, 1994). Low self-esteem also has been associated with inconsistent use of contraceptives among adolescent girls (Miller et al., 2000).

Various indicators of psychosocial distress, which frequently co-occur with low self-esteem, have been found to relate to adolescent sexual activity, with higher levels of distress being associated with greater sexual activity (e.g., Harvey & Spigner, 1995; Luster & Small, 1994; Orr et al., 1991; Tubman et al., 1996). However, only one study found a direct association between psychological health and sexual risk behavior: Luster and Small (1994) found that adolescent males who engaged in high-risk sexual behaviors reported more suicidal ideation than those who engaged in low risk-taking sexual behaviors.

Related to psychological distress, several researchers have found that a history of victimization is associated with sexual risk-taking behaviors. Sexual abuse, in particular, has been related to outcomes of risky sexual behavior, such as teenage pregnancy (Roosa et al., 1997). Among a sample of adolescent females, Biglan et al. (1995) found that 41.7% reported at least one experience of sexual coercion, described as the use of aversive behavior to force someone into sexual intercourse. Compared to those who did not report a history of sexually coercive experiences, those who did were more likely to engage in various sexual risk behaviors, including having sex under the influence of drugs or alcohol and having sex with an unknown partner, as well as more likely to experience negative outcomes of such risk-taking, such as pregnancy or sexually transmitted diseases. While other studies (e.g., Mezzich et al., 1997) have found a relationship to sexual risk behavior for both physical and sexual abuse, a more recent study by Fiscella, Kitzman, Cole, Sidora, and Olds (1998) has attempted to tease apart the differential effects of sexual and non-sexual abuse on adolescent sexual risk-taking. Differing theories contend that all forms of abuse can affect the development of problem behaviors in general (e.g., Jessor & Jessor, 1977), of which sexual risk behavior is one, or that sexual abuse can give rise to a particular constellation of negative outcomes, including traumatic sexualization (Finkelhor & Browne, 1985). In this case, Fiscella et al. found support for the latter theory, as sexual, but not physical, abuse was related to earlier pregnancy among African American adolescents.

Adolescents who report higher levels of religiosity are less likely to engage in sexual intercourse (Bingham & Crockett, 1996; Crockett, Bingham, Chopak, & Vicary, 1996; Levinson, Jaccard, & Beamer, 1995). However, religiosity has not been found to reliably predict sexual risk behavior. Jemmott and Jemmott (1992) found that inner-city Black male adolescents who score higher on a measure of religiosity were more likely to use a condom during sex than their less religious peers, but the relationship was of only marginal significance once family structure, SES, and age were considered. Likewise, religiosity was inversely related to sexual risk behavior in a large survey sample of adolescents in Minnesota; however, the standardized regression coefficient was very small and accounted for very little of the variance in the dependent variable (Neumark-Sztainer, Story, French, & Resnick, 1997). In a more recent study, Miller et al. (2000) found no relation between religiosity and adolescent sexual behavior among minority youth.

Adolescents' knowledge about sexual risk-taking and its association with negative health outcomes, such as HIV infection or pregnancy, has received considerable attention as a predictor of sexual risk behavior. However, there does not appear to be a clear association between knowledge of sexuality or HIV/AIDS risk factors and adolescent sexual risk-taking practices. In our review, 10 studies were located that directly assessed the relation between sexual knowledge and sexual risk behavior. Five studies found that more knowledge about sexual risk practices and prevention was

significantly associated with either more consistent condom use (Holtzman, Lowry, Kann, Collins, & Kolber, 1994; Reitman et al., 1996; Stanton et al., 1994), contraception use in general (Jemmott & Jemmott, 1990), or fewer sexual partners (Zimet et al., 1992). Four studies found no association between knowledge and sexual risk practices (Brown et al., 1992; DiClemente et al., 1992; Melchert & Burnett, 1990; Romer et al., 1994), and one actually found that more accurate knowledge of HIV risk factors was associated with higher levels of sexual risk behavior among a sample of substance abusing youth (Langer & Tubman, 1997).

The lack of consensus regarding the relation between accurate knowledge of sexuality and sexual risk practices is consistent with the observation of many researchers in the area of sexual risk behavior prevention that knowledge alone does not relate to behavior or behavior change (e.g., Baldwin, Whitely, & Baldwin, 1990; St. Lawrence, Jefferson, Alleyne, & Brasfield, 1995). Interestingly, a study by Hubbs-Tait and Garmon (1995) has found some empirical confirmation of this explanation. These authors determined that the relationship between increased sexual knowledge and decreased sexual risk-taking is mediated by higher levels of moral reasoning. Further research is clearly warranted in order to more firmly establish the mediational role of this and other variables in the translation of knowledge to behavior.

Other cognitive processes, such as perception of personal risk or attitudes toward sex in general, may also provide a link between sexual knowledge and sexual behavior. In terms of risk perception, or perceived vulnerability to the negative consequences of sexual risk behavior, the picture is not very clear. The six studies in our review that examined the relation between perceived vulnerability and sexual risk behaviors yielded inconsistent results. Some found that youth who perceived themselves to be more vulnerable to potential negative health outcomes following sex were more likely to engage in risk-reduction strategies such as condom use (Pendergrast et al., 1992; Zimet et al., 1992) and fewer sexual partners (Miller, Kotchick, & Forehand, 1999), while others found that increased perception of risk was associated with greater levels of sexual risk-taking behavior (Langer & Tubman, 1997; Millstein & Moscicki, 1995). Still others found no association between risk perception and sexual risk behavior (Orr et al., 1991; Shafer & Boyer, 1991).

As studies such as these suggest, the literature on the association between risk perception and behavior is littered with inconsistent findings, all of which conceptually make some sense. For example, an adolescent who perceives herself to be at greater risk for contracting an STD or HIV or becoming pregnant may have that perception because she is aware of her engagement in risky sexual practices. Thus, greater risk-taking behavior may lead to an increased perception of personal risk. On the other hand, an adolescent who engages in risky sexual practices may be doing so because he does not consider himself to be at risk; in this instance, a reduced level of personal vulnerability may contribute to greater risk-taking behavior. The confusion in this area is likely due to the exclusive use of concurrent analyses to evaluate the relation between risk perception and sexual risk behavior. Such analytic designs do not afford an opportunity to test the direction of the association, and thus establish a causal inference. As noted by Millstein and Moscicki (1995), only the use of prospective research designs and well-defined measures of risk perception will clarify the nature of the relationship between risk perception and risk behavior.

Beyond perceptions of personal risk or vulnerability, attitudinal factors relating to the morality of sex and toward risk reduction practices have been associated with sexual risk behaviors. For example, more liberal attitudes about teenage sexuality

have been found to relate to higher levels of sexual risk-taking behavior among urban Black male adolescents (Jemmott & Jemmott, 1990). Conversely, a stronger commitment to "conventional" values has been found to relate to lower levels of sexual risk-taking in a sample of pregnant adolescents (Gillmore, Butler, Lohr, & Gilchrist, 1992). Several researchers also have documented the finding that adolescent attitudes toward risk-reduction strategies, like condom use, are associated with their use. Adolescents with more positive attitudes toward condoms tend to report greater use of condoms (DiClemente et al., 1992; Jemmott & Jemmott, 1990; Pendergrast et al., 1992; Reitman et al., 1996). Espousal of high-risk attitudes toward contraceptive use was significantly related to unreliable use of birth control in a sample of adolescents in a juvenile justice program, though the inverse (i.e., espousal of low-risk attitudes) was not related to reliable contraceptive use (Melchert & Burnett, 1990).

Behavioral factors. Sexual risk-taking behaviors are correlated with a number of other behaviors, including delinquency, substance use, and other indices of sexual activity in general. Problem behavior theory (e.g., Jessor & Jessor, 1977; Jessor et al., 1995) suggests that sexual risk behavior would co-occur with other problem behaviors, such as delinquent activities or substance use, during adolescence. Indeed, substantial evidence has accumulated to support the association between adolescent sexual risk behavior and involvement in delinquent behaviors.

Devine et al. (1993) found that general delinquency was associated with a greater number of sexual partners for both girls and boys. Stouthamer-Loeber and Wei (1998) found that teenage boys who became fathers were more than twice as likely to have committed acts of serious delinquency than non-fathers. Similarly, fighting and other measures of delinquency (e.g., school suspension or expulsion, drug use) emerged as significant predictors of rapid repeated pregnancies among a sample of adolescent mothers (Gillmore, Lewis, Lohr, Spencer, & White, 1997). An earlier study by Gillmore et al. (1992) also found that delinquency affected the relationship between substance use and risky sexual behavior among pregnant adolescents. Scaramella et al. (1998) reported that delinquent behavior and substance use in the 9th and 10th grades prospectively related to pregnancy status in 12th grade.

A number of other studies have documented the relationship between substance use and sexual risk practices. The national Youth Risk Behavior Survey data indicate that high-risk sexual behaviors (e.g., multiple sexual partners, no condom use at last intercourse) were most prevalent among adolescents who had used illicit substances during the past year (Lowry et al., 1994). Others have found that a history of alcohol and/or drug use correlated with inconsistent condom use (Brown et al., 1992; Cooper et al., 1994; Fullilove et al., 1993; Keller et al., 1991; Luster & Small, 1994; Miller et al., 1999; Millstein & Moscicki, 1995; Shrier et al., 1996) and having multiple sexual partners (Devine et al., 1993; Duncan, Strycker, & Duncan, 1999; Fullilove et al., 1993; Koniak-Griffin & Brecht, 1995; Tubman et al., 1996).

Use of alcohol or drugs immediately prior to or during sexual encounters is also related to decreased condom use (Bagnall, Plant, & Warwick, 1990; Fullilove et al., 1993; Jemmott & Jemmott, 1993; Strunin & Hingson, 1992). For example, among inner-city Black male adolescents, those who reported a higher frequency of having had sex while "high" were more likely to have unprotected sexual intercourse, a greater number of sexual partners, and a greater number of "risky" sexual partners (Jemmott & Jemmott, 1993). Similarly, adolescents who reported a high frequency of

combining alcohol consumption and sexual behavior were seven times less likely to use a condom (Bagnall et al., 1990). A study by Dermen, Cooper, and Agocha (1998) conducted a test of expectancy theories, and found that those adolescents who expected that alcohol consumption would decrease sexual inhibitions were more likely to have sex under the influence of alcohol, as well as engage in other risk behaviors, such as unprotected sex.

The robust relationship between adolescent sexual risk-taking behavior and other risk behaviors, such as drug use or engagement in delinquent activities, may be explained, in part, by personality characteristics, including a tendency toward sensation-seeking or impulsivity. Indeed, some research has found that higher levels of sexual risk-taking behavior are reported among youth who also score higher on measures of sensation-seeking (Brown et al., 1992; Neumark-Sztainer et al., 1997) and who perceive themselves as having little behavioral control (Mezzich et al., 1997; Millstein & Moscicki, 1995). Additionally, Problem Behavior Theory (Jessor & Jessor, 1977) also serves to explain the strong co-occurrence of risky sex with other potentially harmful behaviors. In a longitudinal study employing latent growth curve modeling, Duncan et al. (1999) found strong support for Problem Behavior Theory, as the development of three types of substance use (alcohol, cigarettes, and other drugs) covaried with the development of risky sexual behaviors. In addition, in a study of female adolescents with and without substance abuse disorders, Mezzich et al. (1997) found not only that substance use problems and risky sexual behavior are strongly related, but that they share many of the same risk factors (e.g., behavioral dysregulation, childhood victimization).

Not only do other risk behaviors (e.g., drug use) correlate with sexual risk-taking among sexually active youth, but so do other aspects of sexual behavior. A longitudinal study of urban adolescents found that early sexual debut is related to multiple aspects of risky sexual behavior, including inconsistent condom use, pregnancy, and a greater number of sexual partners (Smith, 1997). These findings have been shown across other studies as well, where adolescents who were younger at the initiation of sexual activity report less condom use at first intercourse (Melchert & Burnett, 1990; St. Lawrence & Scott, 1996) and in subsequent sexual encounters (Melchert & Burnett, 1990; Smith, 1997), as well as have higher rates of pregnancy than their peers who were older at sexual initiation (Roosa et al., 1997; Smith, 1997). DiClemente et al. (1992) discovered that the number of sexual partners was inversely related to condom use; and Gillmore et al. (1992) also found that the number of years that an adolescent has been sexually active is positively correlated to a variety of sexual behaviors that increase one's risk for contracting sexually transmitted diseases.

In summary, a number of factors from the self-system that have been found to relate to an adolescent's sexual status have also been associated with adolescent sexual risk behavior. However, the findings are not consistent for some variables commonly believed to have an influence on adolescent sexual behavior. Most notably, the relation between adolescent sexual risk behavior and knowledge about sexual risk factors and perceived personal vulnerability to undesirable outcomes of sexual activity are not well understood. More research is needed to examine the role of self-esteem, self-efficacy, and general psychological health in the promotion of safer sex practices. Finally, a more expanded investigation is needed to explore the social, emotional, and environmental pathways through which biological variables, such as race and gender, relate to adolescent sexual risk-taking behavior.

The Family System

Familial influences on adolescent sexual activity can be divided into two primary categories: family structure variables and family process variables. In general, the latter category of variables has received more attention than the former category. However, there is evidence that structural factors, such as single parenting, SES, and parental education, should not be ignored. To this end, several studies have shown that living with one's parents is often a protective factor against risky sexual behavior (e.g., Jemmott & Jemmott, 1992; Metzler, Noell, Biglan, Ary, & Smolkowski, 1994). In a longitudinal study of pregnant adolescents, Gillmore, Lewis, et al. (1997) found that, among the girls who were pregnant at the beginning of the study, those who were living with at least one parent or stepparent at that time were less likely to be pregnant again within 18 months of childbirth. While these results show that living with at least one parent serves a protective role, other findings suggest that living with two parents can further protect adolescents from engaging in risky sexual behavior. For example, Baumeister et al. (1995) examined familial characteristics of Latina adolescents in two groups, one never pregnant and another pregnant or parenting, and found that living with an intact family (i.e., parents married or living with a partner) significantly discriminated between the two groups. Additionally, Devine et al. (1993) found that parental divorce during early adolescence was a significant predictor of sexual risk behavior for females in later adolescence.

Other family structure variables, such as SES, may be related to adolescent sexual risk behavior. In one study of urban adolescents, living in poverty, especially when combined with low academic skills, was related to early pregnancy (Gordon, 1996). Roosa et al. (1997) found similar associations between SES and risk for teenage pregnancy. Studies such as these would suggest that family structural variables warrant greater attention in sexual risk behavior research with adolescents. However, it is important to note that one recent study (Miller et al., 1999) examined several aspects of adolescent sexual risk behaviors (e.g., number of sex partners, consistency of condom use) and failed to find any relationship between family structural variables (i.e., parental education, marital status, family income) and these risk outcomes. Unfortunately, further conclusions regarding family structure variables such as these are difficult to draw, as these particular variables are often statistically controlled due to their covariance with other variables.

In terms of family processes, parenting behavior has been identified as an important source of influence on adolescent sexual activity. Throughout the socialization process, parents transmit their own standards of conduct, both directly through their parenting practices and indirectly through their own observable behavior. In regard to the direct transmission route, three dimensions of parenting —parental monitoring of adolescent behavior, parent–adolescent relationship quality, and parent–adolescent communication — have been identified as important variables in reducing adolescent sexual risk-taking behavior.

Parental monitoring or supervision of adolescents' social activities has been consistently associated with less frequent sexual behavior. While frequency of sexual activity is not, by itself, among the behaviors considered to be risky in this review, less frequent sexual activity would certainly decrease an adolescent's risk for negative sexual outcomes. For example, Romer et al. (1994) found that greater parental monitoring was associated with less sexual activity among 9–15 year old minority youth. Other studies have found that lower levels of monitoring have been associated

with a greater number of sexual partners (Luster & Small, 1994; Metzler et al., 1994; Miller et al., in press; Rodgers, 1999) and inconsistent use of contraception (Luster & Small, 1994; Metzler et al., 1994; Rodgers, 1999).

Related to parental monitoring, adolescents' ratings of parental strictness have also been shown to be significantly associated with sexual risk behavior. In a survey of African American adolescent males, Jemmott and Jemmott (1992) noted that perceived parental strictness related to sexual risk differentially for each parent: having a strict mother was related to fewer sexual partners, while having a strict father was related to more consistent condom use. While research, such as that reported in the studies described above has shown that monitoring may protect children and adolescents from sexual risk, a recent study by Rodgers (1999) has found that this protective measure may only work up to a point. In her study, Rodgers found that while monitoring in a general sense was related to decreased sexual risk, the degree to which parents exert psychological control over their adolescents and deny them adequate autonomy was associated with higher odds that female adolescents would take greater sexual risks. This finding is consistent with research conducted by Mason and colleagues which found that either too much or too little parental control was associated with increased problem behaviors among African American adolescents (Mason, Cauce, Gonzales, & Hiraga, 1996).

The quality of an adolescent's relationship with her or his parents, including how the adolescent perceives this relationship, is another aspect of the family system that appears to affect sexual risk behaviors. In comparison to low-risk adolescents and sexual abstainers, those adolescents who are at high sexual risk (i.e., multiple partners, inconsistent contraception) are less likely to perceive positive levels of parental support (Luster & Small, 1994). Parental support and involvement has also been shown to be indirectly related to decreased sexual risk behaviors, as noted by Metzler et al. (1994), who included perceived parental support in their model of the social context of sexual risk-taking, alongside other family variables, peer influences, and academic factors. Similarly, Scaramella et al. (1998) found that the relationship between parental warmth and pregnancy by the 12th grade was mediated by involvement in other risk behaviors in middle adolescence (increased risk of pregnancy) and academic competence in early adolescence (decreased risk of pregnancy). However, other studies have not been able to document such a clear association between parent–adolescent relationships and sexual risk behaviors. For example, data from a national longitudinal study of adolescents in grades 7 through 12 found that parent–child connectedness was the key family factor in the development of a variety of general (i.e., nonsexual) risky behaviors, even after controlling for demographic characteristics. However, involvement in a pregnancy by the 12th grade was not among the risk behaviors predicted by family connectedness (Resnick et al., 1997).

The quality of the parent–adolescent relationship is also reflected in the quality of parent–adolescent communication, and communication between adolescents and parents is particularly important for the transmission of information regarding sexuality, HIV/AIDS, and appropriate risk reduction strategies for adolescents. As an illustration of this point, Rodgers (1999) found no direct relationship between parental support and sexual risk behavior for either male or female adolescents. However, among boys, she found a significant interaction between parental support and parent–child communication about sexual risk, such that adolescents of less supportive parents were less likely to benefit from the protective effects of parent–

child communication about risk reduction strategies. In another study, Miller et al. (2000) found that positive general parent–child communication was more strongly related to decreased sexual risk-taking than was parent–child communication about sexual topics — a result that may be attributable to general parent–child communication serving as a proxy for the parent–child relationship, which was related to sexual risk-taking in their sample. These findings provide further evidence that parent–adolescent relationship quality is an important factor to consider, while also serving to underscore the potential impact of parent–adolescent communication on sexual risk reduction.

While many researchers have shown that parental communication about sex is related to decreased sexual risk behavior among adolescents (e.g., Baumeister et al., 1995; Leland & Barth, 1993; Luster & Small, 1994; Mueller & Powers, 1990), most of this research has only examined whether or not the communication occurred, rather than the particular characteristics of how the communication happened. However, recent research by K. S. Miller and her colleagues have noted that several aspects of parent–child sexual communication, including the timing of the discussions (Miller, Levin, Xu, & Whitaker 1998), the content or topics discussed (Dutra, Miller, & Forehand, 1999; Miller, Kotchick, Dorsey, Forehand & Ham, 1998), and the process of the communication itself (Dutra et al., 1999), all contribute uniquely to the relation between parental communication and adolescent sexual behavior. Studies by other researchers have supported the importance of the characteristics, or process, of parent–child sexual communication (e.g., Ward & Wyatt, 1994).

In addition to providing structure (in the form of parental monitoring), support (through a positive parent–child relationship), and information (by communicating about sexual topics), parents serve as role models for their adolescent children in terms of sexual behavior and attitudes (Metzler et al., 1994). Social learning theory (e.g., Bandura, 1977) emphasizes the importance of modeling for the acquisition and maintenance of behavior; yet, parental modeling of sexual behavior has received little empirical attention in the adolescent sexuality literature, and its predictive value remains unclear. A recent study of ethnic minority families found that maternal sexual risk behavior was significantly predictive of adolescent sexual risk behavior, but once maternal attitudes and communication about sex were considered in the analytic model, the significance of maternal sexual behavior disappeared (Kotchick, Dorsey, Miller, & Forehand, 1999). Another study examined via contingency tables the transgenerational patterns of age at the birth of a first child, and found that adolescents whose mothers gave birth at a young age were likely to also be involved in an early pregnancy, a finding that held true for both genders (Hardy et al., 1998). Thus, some preliminary support exists for the notion that parents serve as role models for adolescent sexual behaviors.

In addition to parental behavior and direct modeling effects, adolescent sexual behavior may also be indirectly modeled through transmission of parental attitudes toward sex and sexual risk-taking. There is mounting evidence that perceived parental disapproval of risky sexual behavior is a predictor of more consistent contraceptive use (Jaccard, Dittus, & Gordon, 1996), as well as less sexual activity in general. Similarly, Stanton et al. (1994) found significantly less perceived parental disapproval of adolescent sexual behavior among sexually active girls, particularly those with male partners who were not regular condom users.

In summary, both structural and process family variables have been found to relate to adolescent sexual risk behavior; however, process variables have been examined

more often and found to be more powerful predictors of sexual risk-taking. As seen with the self-system variables, the existing literature consists of studies that vary in terms of the particular predictor and outcome measures included; despite the accumulated findings, nearly all factors reviewed here would benefit from more extensive replication. In addition, some factors that have been studied with respect to adolescent sexual behavior in general but are not represented here, such as parental education level and sibling sexual behavior, deserve attention. Lacking such consistency in the literature, it is difficult to draw any comprehensive conclusions regarding the family system variables, but the state of the research at this point clearly indicates that, within the family system, there are many important risk and protective factors for adolescent sexual risk behavior.

The Extrafamilial System

For adolescents who are in the midst of developing their own identities and establishing more complex social networks, the point of reference by which they guide their behavior shifts from the family to the social environment (Forehand & Wierson, 1993). Of the three systems targeted by this review, the extrafamilial system is the broadest in environmental scope. Unfortunately, it is also the system that has received the least empirical attention in the literature on adolescent sexual risk-taking. As a result, distinct subsystems, such as peers, neighborhoods, and school conditions, have been subsumed under the label of the extrafamilial system, though one could argue that each is its own unique system of influence.

Peers become an important source of reinforcement, modeling, and support concerning value and belief systems during adolescence (Forehand & Wierson, 1993). Thus, it is not surprising that peers' behaviors and attitudes have been found to relate to adolescent sexual risk behavior, especially in light of the findings that adolescents whose peers are sexually active are more likely to be sexually active themselves (e.g., Miller et al., 2000; Romer et al., 1994). Additionally, indicators of sexual risk-taking behavior among adolescents' peer groups (e.g., pregnancy, inconsistent condom use) have been shown to relate to increased adolescent sexual risk (Gillmore, Lewis, et al., 1997; Millstein & Moscicki, 1995). More subjectively, adolescents' perceptions of their peers' behaviors have also been found to relate to sexual risk-taking, as several researchers have found that consistent condom use is associated with the perception of condom use among friends (Brown et al., 1992; Romer et al., 1994; Stanton et al., 1994). A similar study by Pendergrast et al. (1992) found that consistent condom use was correlated with a sexual partner's positive attitudes toward condom use.

Beyond peer's sexual behavior, the behavior of a peer group in general is often related to adolescent sexual risk behavior. Research has repeatedly indicated that association with a deviant peer group, such as one that is involved with alcohol and drug use or delinquency, has been related to participation in high-risk sexual practices (Brewster, 1994; Metzler et al., 1994; Miller et al., 2000). A prospective study by Scaramella et al. (1998) found that deviant peer affiliations comprised a strong pathway to sexual risk in an overall model of adolescent sexual risk behavior.

On the broadest level of the extrafamilial system, the neighborhood or community in which the adolescent lives also serves to influence the types of risk behaviors in which he or she may be involved. The community provides myriad levels of social support, through schools, jobs, social contacts, and other resources. The community

can also serve to hinder an adolescent's development or place the adolescent at greater risk, through a lack of future opportunities, insufficient monitoring, or socioeconomic disadvantage or instability. However, these levels of influence are often difficult to characterize, and have not been extensively studied in the adolescent sexual risk literature. In the only study identified in this review to focus exclusively on the relationship of sociodemographic variables to sexual risk status, Brewster (1994) found that, among African American adolescent girls, lower neighborhood SES, increased levels of female employment, and higher divorce rates were all associated with greater sexual risk-taking. The degree of social support garnered from extrafamilial sources is also likely to be important, as St. Lawrence et al. (1994) found that less social support was related to more frequent engagement in sexual risk behaviors among African American adolescents.

An important aspect of an adolescent's social community is the school environment. School factors, however, have not been extensively examined in the adolescent sexual risk literature. While some studies, reviewed above in the self-system, have found associations between personal academic aspirations and sexual risk behavior, no studies identified in this review have examined school climate in general as it pertains to sexual risk-taking behaviors. One study by Pendergrast et al. (1992) has noted that increased exposure to sexual education in the schools, particularly on the avoidance of sexually transmitted diseases, is related to increased condom use. Further research is needed to investigate the potential effects of the school environment on adolescent sexual behavior.

In summary, the extrafamilial system in general is in need of greater research attention with respect to adolescent sexual risk behavior for two primary reasons. First, as noted above, adolescence is a period of development characterized by the increasing influence of factors outside the family. Therefore, these influences deserve more attention, so that we may better understand the factors involved in adolescent sexual risk behavior. Secondly, of the three systems, the extrafamilial system is the broadest in scope, as it encompasses the larger social context in which adolescents operate. Arguably, this broad context can serve to interact with, augment, or attenuate the influence of variables in the self or family systems, and for this reason must be included for consideration in all aspects of adolescent sexual behavior, particularly as we attempt to discover factors that increase or decrease adolescent sexual risk, and ultimately implement methods of preventing such risk.

Methodological Pitfalls

In addition to the lack of an integrative framework in the literature, research concerning adolescent sexual risk-taking behavior is plagued by methodological limitations that further complicate the process of making sense of the data. In this section, we provide an overview of the methodological pitfalls typical of research in this field. Such a presentation is meant to alert the reader to conditions that may influence the interpretation of the data and to assist in the critical consumption of the available findings. When appropriate, we cite specific studies that demonstrate notable methodological strengths or weaknesses. Methodological problems associated with this line of research may be divided into three broad categories: assessment issues, design/data analytic decisions, and obstacles to the effective consumption and replication of findings.

Assessment issues. Researchers interested in assessing adolescent sexual risk behavior are faced with several difficult decisions when designing a study. The first set of issues relates to deciding upon the measures used to assess sexual behavior. Assessment of such private behavior often results in an exclusive reliance on self-report measures of the outcome variables (Jemmott & Jemmott, 1994). Unfortunately, substantial research utilizing other outcome measures (e.g., externalizing and internalizing problems) indicate that adolescent reports are not necessarily congruent with reports of others (for a review see Achenbach, McConaughy, & Howell, 1987), and therefore may not be a reliable indicator of behavior. Sexual activity is a behavior that may be particularly susceptible to either overreporting or underreporting by adolescents. For example, some adolescent males may be inclined to exaggerate their heterosexual exploits in order to "prove their manhood." Alternately, some sexually active adolescents may deny sexual involvement out of fear that a parent may be informed of their behavior.

Data collected by interviews, particularly face-to-face interviews, introduce social desirability and situational demand characteristics, such as the age, gender, or race of the interviewer, which may influence responding. Moreover, little is known about the reliability of interview methods for assessing sexual behavior. Most researchers fail to even mention this as a potential limitation to their study, and no study could be found that documented an attempt to evaluate the test–retest reliability of the questions or methods used to assess sexual behavior among adolescents.

Innovative methods have been developed recently that may enhance the validity of self-report measures in assessing sexual behavior. Computers that present questions and record responses privately have been utilized to reduce the demand characteristics of face-to-face or telephone interviews that may influence a research participant to under- or overreport sexual behavior (e.g., Romer et al., 1994; Stanton et al., 1994; Turner et al., 1998). When there are concerns about participants' ability to read, questions may be either read aloud by an interviewer or presented verbally in audiotaped format, followed by a private keying of a response using a keyboard. A recent study by Des Jarlais et al. (1999) compared the efficacy of audio computer-assisted self-interviewing (CASI) and standard face-to-face interviewing for reporting HIV risk behavior among adult intravenous drug users. The authors found that participants using audio CASI were more likely to report high-risk behaviors and less likely to report protective behaviors than those in face-to-face interviews. Although similar technology has been used to assess sexual behavior for participants as young as 9 years old (Romer et al., 1994), no empirical evaluation has been conducted to compare the efficacy of computer-assisted assessment versus face-to-face interviewing or self-report paper-and-pencil measures among adolescents.

Several other techniques have been employed to maximize honest self-reporting of sexual behavior. For example, investigators have obtained written informed consent from adolescent participants (which included a discussion of confidentiality and its limits), used anonymous questionnaires, and verbally stressed the importance of honest reporting for the development of programs to help other adolescents prior to beginning their assessment (e.g., Jemmott & Jemmott, 1994). In studies involving both parents and adolescents, parents were interviewed before adolescents in order to reduce concern about disclosure of the adolescent's sexual activity to the parent (e.g., Miller et al., 1999). The use of tools, such as a calendar, to help an adolescent recall her or his sexual behavior during a specified sampling interval has also been suggested as a strategy to increase accuracy in reporting (Jemmott & Jemmott, 1994).

Finally, as suggested by Jemmott and Jemmott (1994), the use of some objective indicator of sexual risk-taking, such as testing for STD infection, has been used to validate self-reports of behavior (e.g., Burstein et al., 1998; Mezzich et al., 1997; Miller, Clark, & Moore, 1997). However, the use of such biological markers does not provide reliable or definitive information about actual behavior, as not all teens who engage in risk practices will contract an STD, nor does the presence of an STD indicate when risk behaviors may have occurred.

Design/data analytic decisions. With very few exceptions, research concerning the correlates of adolescent sexual behavior has employed cross-sectional designs (see Devine et al., 1993; Scaramella et al., 1998, for exceptions). Such studies allow for the identification of variables related to sexual behavior but not for the specification of the direction of those relationships. Causal implications drawn from cross-sectional studies are useful to consider and discuss, as long as the limitations of the data used to draw them are made clear. In fact, the results of many of these cross-sectional correlational studies have been used to develop prevention programs, some of which have been highly effective in reducing adolescent sexual risk-taking behavior (for reviews of prevention programs, see Franklin, Grant, Corcoran, Miller, & Bultman, 1997; Kalichman, Carey, & Johnson, 1996; Kirby et al., 1994). However, there is a substantial need for longitudinal or prospective studies that can elucidate these bidirectional relationships to identify the true "influencing" factors that may be the active ingredients in effective intervention efforts.

Three additional design issues pertain to how variables are selected and analyzed in studies of adolescent sexual risk-taking. First, until recently, there has been a heavy emphasis on single-system analysis in research concerning adolescent sexual behavior. Much of the research currently available examines variables one at a time to determine their independent effects on the outcome variable without consideration of how factors may be organized into larger, more descriptive categories or systems. Notable exceptions include the following three studies: Luster and Small (1994), who studied the association between factors from the individual, familial, and extrafamilial systems and sexual risk outcomes, such as condom use; Resnick et al. (1997), who examined the influence of individual, familial, and school variables on the age at which teens became sexually active; and Miller et al. (2000), who examined variables from the self, family, and extrafamilial systems and their relation to a number of sexual behavior outcomes, including age at first intercourse, number of partners, and condom use.

Second, the study of sexual risk behavior, for the most part, has been limited to lower-order linear analysis; little or no attention has been given to potential mediational, moderational, and nonlinear relationships among the variables and systems of influence already found to be related to sexual outcomes on a bivariate level. The difficulty that arises from the heavy reliance on univariate, linear, and single-level risk factor studies is that the mechanisms that account for the bivariate correlations among predictors and outcomes remain unidentified. Thus, interventions may be less effective than they would be were those mediators and moderators known.

Finally, variables utilized to predict adolescent sexual activity are not always defined as accurately or precisely as they could be. This lack of specificity may encourage the misinterpretation of significant associations between predictors and outcomes, or prevent meaningful relationships from being detected at all. The review of findings that document an unclear relationship between sexual knowledge and sexual risk

behavior illustrates this point well. One likely reason for the lack of agreement among researchers is the inconsistency of measures used to assess sexual knowledge. Very few of the studies (e.g., Hubbs-Tait & Garmon, 1995; Reitman et al., 1996) identified in this review used measures of sexual knowledge that had been previously implemented elsewhere. The majority of studies assessing sexual knowledge created their own questionnaire for the purposes of the study, and without validation or replication (e.g., DiClemente et al., 1992; Langer & Tubman, 1997; Melchert & Burnett, 1990). While the content of the various measures across studies had some elements in common, it is impossible to conduct viable comparisons across studies without consistency in methods. Clearly, this research would benefit from the establishment of a validated and consistently implemented measure of sexual knowledge, in order to specify the construct as well as its relationship to sexual risk behavior.

As a second example of the importance of specificity in measures, Miller, Levin, et al. (1998) recently found that the timing of parental discussions about condoms was important in influencing adolescent use of condoms: discussions that occurred prior to adolescent sexual debut were particularly important in promoting condom use. This finding underscores the importance of "fine tuning" measures rather than examining a broadly conceived variable like "parent–child communication" or even "discussions about sex or condoms." In the same manner, it is difficult to compare the results of studies that define sexual risk-taking differently. For example, the consistent use of contraceptives has been defined as "contraceptive use last sexual encounter" (e.g., Fullilove et al., 1993; Hou & Basen-Engquist, 1997), "frequency of contraceptive use during past six months" (e.g., Miller, Clark, & Moore, 1997; Neumark-Sztainer et al., 1997), and "use of contraceptive at sexual initiation" (e.g., Melchert & Burnett, 1990; St. Lawrence & Scott, 1996). Each measures a slightly different, albeit related, aspect of contraceptive use.

Obstacles to the effective consumption and replication of findings. A final note about methodology refers to the failure of researchers to include important information about the sample and methodology used to conduct their study. Critical information regarding participants is frequently not reported. For example, many studies fail to report information such as the following: why a particular sample was selected for study; how the sample was recruited; what the participation rate was; and relevant demographic characteristics of the participants such as ethnicity and SES (e.g., Roosa et al., 1997). These omissions not only interfere with readers' ability to estimate the generalizability of results, but also prevent findings from being replicated in future studies. The great disparity across studies in what is reported also makes it difficult to compare the results from one study to those of another.

CONCLUSIONS AND RECOMMENDATIONS

Certainly, research in the area of adolescent sexual risk behavior has come a long way from the exploratory and mostly descriptive studies of several decades ago (e.g., Kinsey, Pomeroy, & Martin, 1948; Kinsey, Pomeroy, Martin, & Gebhard, 1953). Much has been learned about the variables that are related to adolescent sexual risk behavior, and effective programs have been developed based on this research literature that provide youth with the knowledge, skills, and resources to manage

their transition to sexual adulthood safely (e.g., Gillmore, Morrison, et al., 1997; Kipke, Boyer, & Hein, 1993; St. Lawrence, Brasfield, Jefferson, O'Bannon, & Shirley, 1995; St. Lawrence, Jefferson, et al., 1995). Based on this research, social and political attention has been devoted to the larger contextual variables and environmental conditions that appear to promote sexual risk-taking by adolescents, and public policies dedicated to empowering youth and their families have been implemented (e.g., Children Now & the Kaiser Family Foundation, 1999).

Nevertheless, there is much room to grow in the field of adolescent sexual behavior research, and substantial improvements in research design are needed to answer the questions raised by the available literature: What are the factors that contribute to the developmental pathways ending with sexual initiation, and are they the same factors that guide decision-making about engaging in risk behavior? What is the chronological sequence of events that influence sexual risk-taking behavior? How are all the factors identified as correlates of adolescent sexual risk behavior related, and in what manner do they exert direct and indirect effects on each other and on sexual behavior?

Questions such as these present dilemmas and challenges to researchers in this field. The rapid advances in statistical methodology and measurement strategies offer tools with which to address the limitations noted in this review and to move our knowledge and understanding of adolescent sexuality to new heights. With these challenges and advances in mind, we offer the following recommendations for future research:

1. More attention must be given to comprehensive models that take into account factors from multiple systems of influence and their combined effects on adolescent sexual risk-taking behavior. Examples of such models would include mediational pathways in which familial (e.g., parent–child relationship) and extrafamilial (e.g., peer norms) factors influence sexual behavior through their effect on self-system variables, and models that consider nonlinear relationships among predictor and outcome variables (e.g., too much or too little parental strictness being related to more adolescent sexual risk behavior).
2. Many variables found to be related to the sexual activity of adolescents have not been studied with regard to sexual risk-taking behaviors. More research is needed to understand the role of these variables in promoting sexual risk or sexual safety.
3. Strategies to enhance the validity and accuracy of self-report of sexual behavior need to be further explored and developed. The use of computer-assisted interviewing offers particular promise; however, the practicality of its use with low literacy teens and those unfamiliar with computers still needs to be established.
4. By far, the most extensively studied sets of variables are those from the self-system. Future research should focus more attention on familial and extrafamilial factors that may contribute to adolescent sexual risk behavior. Extrafamilial contexts, such as school and neighborhood conditions, offer particular promise for inclusion as both targets and resources in prevention programs designed to reduce STD infection, pregnancy, and the transmission of HIV among youth. However, the specific factors within these contexts that are predictive of sexual risk behavior must be better specified or identified before they may be useful additions to prevention efforts. Furthermore, many

of the self-system variables found to be related to sexual risk behavior are not amenable to change (e.g., age, gender, race) and may merely serve as proxies for the familial or extrafamilial conditions or factors associated that truly influence behavior.

For practitioners working to reduce sexual risk behaviors and their resultant health hazards, the literature reviewed here and the multisystemic perpective used to integrate the findings offer several guidelines. First, prevention and education efforts must be broad in scope and target factors from multiple systems of influence. While skills and knowledge are important, adolescents who possess adequate knowledge about the risks involved with sexual activity and the competence to engage in risk reduction strategies are still having unprotected sex, becoming pregnant, and contracting STDs, including HIV. Prevention programs need to consider the broader context in which the adolescent lives. Familial and extrafamilial sources of behavioral influence should not be ignored when designing prevention programs, and, to the extent possible, both family members and peers should be included in prevention efforts.

As family researchers, we propose that parents are a very powerful socializing force in the lives of children and adolescents. Parents are in a unique and powerful position to shape young people's attitudes and behaviors and to socialize them to become sexually healthy adults. They can do this, in part, by providing accurate information about sex and its risks, consequences, and responsibilities, and by imparting skills to make responsible decisions about health. However, the strength of their impact, relative to other information sources, may arise from their unique ability to engage their children in dialogues about sexual development and decision-making that occur early and are continuous (i.e., not one-time events), sequential (i.e., building upon each other as the child's cognitive, emotional, physical, and social development and experiences change), and time-sensitive (i.e., information is immediately responsive to the child's questions and anticipated needs rather than programmed to a curriculum). Thus, we would encourage that prevention efforts include the family as an active treatment component.

Finally, the literature suggests that targets for intervention include both competencies specific to sexual behavior and more general areas of psychosocial or family functioning. For adolescents, individual knowledge regarding sexuality and risk reduction, attitudes about condoms, and sexual self-efficacy represent specific competencies known to be related to reduced sexual risk-taking. For parents, specific targets for intervention include knowledge of adolescent sexual behavior, monitoring of dating behavior, and skills to communicate with their adolescent children about sex. However, broader indices of functioning, such as depression and anxiety, general parenting skills, and parent–child relationship quality, are all appropriate targets for interventions seeking to promote well-being and reduce sexual risk behavior among adolescents. In this sense, we would encourage prevention and intervention efforts that have as their ultimate goal the development of healthy and well-adjusted youth. Risk reduction would be part, but only a part, of such programs, and the result would be teens and families that value and foster sexual health and safety as part of overall well-being.

As this literature review noted, numerous variables from the self, family, and extrafamilial systems have been found to be related to adolescent sexual behavior. Only recently have multisystem analyses that capture the complexity of the adoles-

cent sexual experience been undertaken, yielding evidence for the influence of variables from all systems and suggesting that variables from across systems interact to increase the probability of adolescent sexual risk-taking behavior. Numerous issues face researchers and clinicians working with youth who are sexually active or who may soon become sexually active. Armed with recent advances in statistical and measurement technology, researchers in this field stand poised to make substantial contributions to our understanding of sexual risk behavior among adolescents. It is our hope that the suggestions offered in this review prompt researchers and clinicians alike to adopt a broad perspective toward adolescent sexual risk and health in general, and, in doing so, take those important next steps toward advancing our knowledge and improving the lives and safety of today's and tomorrow's youth.

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