Applying ecological perspectives to adolescent sexual health in the United States: rhetoric or reality?

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Abstract

This study sought to determine the perspective taken toward understanding adolescent sexual risk behaviors and related biological outcomes (i.e. pregnancy, sexually transmitted diseases) since 1990. We content analyzed 324 abstracts representing observational research published between January 1990 and December 2007 for inclusion of ecological (environmental) factors, level of analysis, sample composition and type of behavioral and biological outcomes. A majority (95%) of studies included individual characteristics; half were void of any environmental factors. Of those including environmental factors, 27% included familial, 23% community, 13% relational and 3% societal factors. Most (80%) were positioned at the individual level of analysis. Samples were diverse (43%) and of mixed gender (71%). Biomarkers of sexually transmitted diseases (7.5%) or pregnancy outcomes (2%) were rare. Ecological inclusion was not related to year of publication. Despite the rhetoric highlighting, the importance of an ecological perspective in understanding adolescent sexual risk behavior, much published research, excludes environmental influences.

Applying ecological perspectives to adolescent sexual health: rhetoric or reality?

Over the past few decades, there has been increasing interest in adolescent sexual health mainly due to the dual public health issues of sexually transmitted diseases (STDs) and teen pregnancy. Sexually active adolescents have a higher risk of acquiring STDs than sexually active adults [1, 2]. A recent national survey showed one in four adolescent females aged 14–19 had an STD [3]. These findings are of particular concern since chlamydia and gonorrhea infections have been found to increase the risk of HIV infection in females [4–6]; and untreated STDs can result in serious health consequences, including pelvic inflammatory disease, ectopic pregnancy, chronic pelvic pain and infertility [4, 7–9]. Similarly, despite somewhat stable declines in recent years, teen pregnancy rates and associated costs remain a burden for the nation. Costs of teen childbearing exceeded $9 billion in 2004 alone [10, 11]. However, the social and emotional costs for teen parents and their families may far outweigh the financial strain as teen mothers and their children are more likely to experience negative health, social and economic outcomes [10, 11].
It has become clear that gaining a more thorough understanding of these issues requires an examination of the interrelated contextual risk factors influencing adolescent sexual behavior. Yet, it appears that researchers seldom move beyond individualistic approaches [12]. In response, experts in the field have called for an ecological approach when examining interrelationships between multiple levels of influence on health outcomes [12–19]. An ecological approach entails an examination of the mutual bidirectional transactions between human beings and the properties of the environmental systems in which they interact [20]. Bronfenbrenner [20] identified four specific environmental systems as influences on the individual: the micro-, meso-, exo- and macrosystems. The microsystem refers to the ‘face-to-face’ environmental influences in specific settings and may include interactions within one’s family, informal social networks, church or work groups. Contributing factors at this level would include sexual partner characteristics, sexual networks, network size, STD prevalence within immediate sexual networks, family and peer social support networks and peer norms for sexual risk behavior. The mesosystem refers to the interrelations or connections between the hypothesized microsystem factors. The exosystem refers to forces within the larger social system in which the individual is embedded, but the individual does not have an active role within these larger systems. Contributing factors would be community-level poverty rates and community-level STD rates. The macrosystem refers to cultural beliefs and values that influence all the other systems. Knowledge gained from investigations incorporating elements from adolescents’ ecology is essential for designing effective interventions to address STDs and unintended pregnancy among adolescents.

Despite increased interest in applying an ecological approach for investigations of adolescent sexual behavior, to date, only one review has focused solely on the integration of ecological approaches in preventive interventions for adolescents [21]. Not surprising, most of the interventions reviewed focused exclusively on individual characteristics (e.g. individual knowledge and attitudes), while none accounted for environmental influences (e.g. sociocultural factors). The focus on the individual-level factors in interventions may stem from a lack of empirical data investigating ecological factors in observational studies. Using an ecological approach in observational studies can provide a more thorough understanding of the determinants of STDs and teen pregnancy; thus, subsequent preventive interventions can be developed and implemented.

The vast body of sexual health and behavior literature has not been systematically reviewed to determine the extent to which ecological factors have been included in observational studies of adolescents. Our primary purpose was to determine whether the incorporation of ecological approaches is merely rhetoric or reality. We conducted a content analysis of observational investigations of adolescent sexual health and behavior published between 1990 and 2007. A content analysis is a method for systematically reviewing text to assess the presence and frequency of specific concepts, in this case ecological factors (concepts) in published studies of adolescent sexual health and behavior (text). We sought to examine systematically studies on adolescent sexual risk behavior published between 1990 and 2007. The rationale for this time frame was to allow the field sufficient time to respond to Bronfenbrenner’s seminal book and to also include a long enough time period to assess trends. Our method for this analysis was influenced by other analyses of bodies of literature [22–28]. A secondary purpose was related to other aspects of the research methodology (the studies’ level of analysis, the sample composition and the nature and type of behavioral, STD and pregnancy outcomes).

**Contextual framework for the content analysis**

Determining whether the studies examined ecological factors that go beyond individual characteristics and provide context in explaining variance in the behavioral outcomes of interest is important. This feature of a study is identified through examining the specific risk factors, predictors and/or correlates of adolescents’ sexual risk and ascertaining whether they are considered to be individual characteristics
(e.g. depression, sensation seeking, etc.) or aspects of the adolescent’s ecology (e.g. relationship dynamics, parental monitoring, peer norms, school connectedness, etc.).

Another important characteristic to examine is the studies’ level of analysis, which is determined by the unit of analysis used for measurement. The level of analysis may ultimately be used to determine the applicability of the findings, such as to individuals or to a larger group such as an entire community [29]. It is not what you are measuring, it is the level at which one wants to draw conclusions. For example, a study that measured depression (i.e. an individual characteristic) among a national sample of adolescents [30] would be at the societal level if the mean depression score was used in an analysis with other countries’ adolescent depression scores, whereas a study that examined school connectedness among a sample of detained youth would be at the individual level of analysis if school connectedness scores were correlated with scores for other study variables.

Another important characteristic is the composition of study sample. The study sample demonstrates which populations researchers hypothesize are integral to understanding the issue or which populations are most at risk. Several features that define the sample composition are important such as the gender and racial make up of the sample and from where the sample was recruited (e.g. clinic, school, community-based organization). The way in which the sample was generated is also important as sampling technique equates with the specificity or the generalizability of the results. This aspect is very important in studies that seek to include ecological factors as it speaks to the ability to characterize a higher level group based on data collected from individuals.

The type and nature of the behavioral outcomes are important features of a research study that examines adolescent sexual risk behaviors. For example, studies, which examine only one behavioral outcome such as whether the adolescents engaged in sex, do not tell the whole story. Conversely, research that includes additional behavioral measures such as condom use, number of sex partners, age of sex partners, concurrent partners and frequency of sex is more comprehensive and can more effectively identify which behaviors place adolescents most at risk for STDs and pregnancy. Along this vein, behavioral risk is not always related to disease or pregnancy outcomes. Thus, it is important to determine whether the research includes some measure of these outcomes and how it was measured (i.e. self-report or biomarker), so that relationships can be determined.

## Methods

### Sample

The goal of this content analysis was to examine the approaches employed in the United States during a specific time period (i.e. January 1990 to December 2007) to the study of adolescent sexual risk behavior. Thus, article abstracts that were published in peer reviewed health and social science journals were examined. A search was conducted in the databases PsychInfo and MEDLINE via Ovid to create the sample of abstracts to be content analyzed. Based on a literature review conducted by Kotchick et al. [31], the following search terms were used to identify relevant articles for inclusion: ‘adolescent sexual behavior, adolescent risky sexual behavior and adolescent sexuality’. Additionally, articles to be included in the content analysis sample had to meet four inclusion criteria as follows: (i) the study examined adolescents (i.e. age ≤25 years), (ii) the sample was English speaking and US based, (iii) participants were not classified as having ‘special needs’ (e.g. developmentally disabled) and (iv) the study reported sexual risk as an outcome. Exclusion criteria were (i) intervention studies, dissertations and conference proceedings, (ii) non-empirical in nature (e.g. book chapters, reviews, commentaries, scale validations) or (iii) sample involved persons living with HIV/AIDS.

Initial searches using key terms and restricting for date (January 1990 to December 2007) yielded 2139 abstracts. Because search terms were broad, we conducted a preliminary review of abstracts to determine if the sample abstracts met inclusion criteria. Through this process, we reduced the initial sample of 2139 to 592 abstracts.
Coding scheme

Using a subsample of 50 abstracts randomly selected, we worked collaboratively to define criteria for level of analysis, ecological levels, sample affiliation and sexual outcomes (i.e. behavioral, STD and pregnancy). Through an iterative process entailing question and answer cycles of examining categories for each characteristic and subsequently refining and modifying them, we defined our coding scheme.

Ecological factors

The first step determined if the abstract contained ecological factors spanning four categories: relational factors, familial factors, community factors and societal-level factors. Examples of factors warranting designation within each of the respective categories include: partner communication or relationship dynamics (relational), parental monitoring or family structure (familial), norms regarding sexual risk behavior or neighborhood poverty levels (community) and cultural norms, racism or media exposure to sexual content (societal). An abstract could be assigned multiple codes for ecological level, but if it contained no information warranting any of the four categories, it was coded as ‘individual’. Table I provides examples of variables that were coded for individual and for each of the ecological categories.

Level of analysis

Level of analysis referred to the level at which the study made generalizations and was defined by three categories: (i) individual, (ii) systems organizational and (iii) community societal. The individual level of analysis included studies where results were generalized to the sample of individuals in the study. Systems-organizational category was for studies that generalized to system personnel (e.g. pediatricians, adolescent health care providers), whereas community–societal category involved studies that generalized to a higher level such as a school district, an entire community, state or to the United States.

Sampling method

The third coding step assessed the general sampling methods used in each study. For this category, we used the following codes: non-random, random probability and unable to determine.

Sample composition

The fourth step examined the studies’ sample composition via three categories, including sample affiliation, participant gender and racial/ethnic diversity of the overall sample. Sample affiliation assessed the sources from which participants were drawn. For example, abstracts stating that the research employed data from state or national level databases such as the Youth Risk Behavior Surveillance System or the National Longitudinal Study of Adolescent Health (AddHealth) were coded as societal. Other options included school, clinic, community (i.e. town or city) and detention center.

Gender of the sample was coded as female only, male only or mixed. Many abstracts omitted descriptions of specific racial/ethnic categories. As such,
coding for this variable was limited to assessing racial/ethnic diversity in general. Code options included all minority, mostly minority (i.e. sample comprised >80% minority groups), all White, majority White and diverse (i.e. sample comprised a range of racial/ethnic groups including White).

Abstracts with insufficient descriptions of sample affiliation and/or gender were coded as ‘other’ for these categories. When an abstract did not mention sample affiliation and/or racial/ethnic composition, these categories were assigned the code ‘unable to determine’.

Sexual outcomes

The fifth and final coding step required assessment of studies’ sexual outcome variables. Categories included (i) a general classification of ‘sexual risk’, (ii) number of sexual partners, (iii) age of sexual debut, (iv) engagement in unprotected penile–vaginal or anal sex, (v) condom use, (vi) STD outcomes and (vii) pregnancy outcomes. STD outcomes were coded as self-report or biomarker, depending on how abstracts described their measurement in the study. If an abstract mentioned STD outcomes, but did not specify how they were determined, it was coded as ‘unable to determine’ for this category. Additionally, if a study did not assess STD outcomes, this category was assigned a code of ‘none’. The same procedure was used to code pregnancy outcomes as well.

Coding procedure and plan of analysis

A random sample of \( n = 125 \) abstracts was generated to determine the reliability of our coding scheme. Two independent coders each coded this sample. Cohen’s Kappa (\( \kappa \)) was employed for assessing interrater reliability (IRR) [32]. Among variables for which the data exhibited good agreement but kappa values were either falsely low [33–35] or unobtainable, simple percent agreement [36] was used as an alternative IRR measure. Lower than adequate reliability was resolved through discussion and consensus and when necessary, recoding was completed. Based on the guidelines of Landis and Koch [37], final Cohen’s Kappa values ranged from substantial to perfect (0.766–1.000); findings for simple percent agreement were also favorable (83.2–100%) [37]. See Table II for variable specific outcomes.

After reliability was obtained, the sample was divided evenly between the independent coders. While coding the final sample, 268 additional abstracts were found that did not meet study inclusion criteria. As a result, the final coded sample comprised 324 abstracts. When ‘major coding categories’ could not be ascertained from the abstract, the full article was accessed.

In addition, after completing the coding, we drew a random sample of 5% (\( n = 15 \)) of the articles. We accessed the full article so that we could determine level of agreement between the abstract codes and the full text article codes. One of the coders coded the full articles and comparisons were made. We found a high level of agreement for most of the major coding categories. For first ecological factor, there was 100% agreement; for the second ecological factor, there was 80% agreement; for the third ecological factor, there was 60% agreement and for the fourth ecological factor, there was

| Table II. Inter-rater reliabilities for key codebook variables |
|-------------------|------------------|
| Variable                 | IRR value          |
| Ecological levels        |                  |
| Individual              | 0.90*             |
| Relational              | 0.85*             |
| Familial                | 0.88*             |
| Community               | 0.83*             |
| Societal                | 0.94*             |
| Level of analysis        | 0.88*             |
| Sampling method          | 0.91*             |
| Sample composition       |                  |
| Sample affiliation       | 0.85              |
| Gender                  | 0.95*             |
| Ethnic/racial diversity of sample | 0.86* |
| STD outcomes            |                  |
| Measured in study        | 0.78              |
| Specific outcomes reported (\( n = 18 \)) | 0.77 |
| Pregnancy outcomes       |                  |
| Measured in study        | 0.88              |
| Specific outcomes reported (\( n = 13 \)) | 0.92* |

*IRR value reflects simple percent agreement calculation because \( \kappa \) was indeterminable or falsely low.
93% agreement. For level of analysis and for sampling method, both had 87% agreement.

**Results**

**Year of publication**

Publication year ranged from 1990 to 2007 with most of the studies (81%) being published between the years 1997–2005. The year 2002 had the most studies with \( n = 40 \), which represented 12.3% of the studies analyzed.

**Ecological level**

In looking at the studies in terms of ecological strata included, 55% of the studies (\( n = 179 \)) examined variables from one stratum only. Of those 179 studies, 91% (\( n = 162 \)) examined individual-level factors, 2% (\( n = 4 \)) examined relational-level factors, 4% (\( n = 7 \)) examined familial-level factors and 3% (\( n = 6 \)) examined community-level factors.

Thirty percent of the studies (\( n = 98 \)) examined two strata. Of those, 23% (\( n = 23 \)) examined individual- and relational-level factors, 40% (\( n = 39 \)) examined individual- and familial-level factors, 34% (\( n = 33 \)) examined individual- and community-level factors, while 3% (\( n = 3 \)) examined individual- and societal-level factors.

Fourteen percent of the studies (\( n = 44 \)) examined three strata. Of those, 66% (\( n = 29 \)) examined individual-, familial- and community-level factors, 20% (\( n = 9 \)) examined individual-, relational- and familial-level factors, 7% (\( n = 3 \)) examined individual-, community- and societal-level factors, 5% examined individual-, relational- and community-level factors and 2% (\( n = 1 \)) examined individual-, familial- and societal-level factors.

Three studies (1%) examined four strata: two studies examined individual-, relational-, familial- and community-level factors, while one study examined individual-, relational-, familial- and societal-level factors.

In terms of factors included across strata, almost all the studies (95%) included individual-level factors, 13% (\( n = 41 \)) included relational factors, 27% (\( n = 88 \)) included familial factors, 23% (\( n = 75 \)) included community-level factors and only 3% (\( n = 11 \)) included societal-level factors.

An ecological index was created that represented quantitatively the inclusion of ecological factors by assigning a value of 0 to individual-level factors and a value of 1 to relational, familial, community-level and societal-level factors. The index ranged from 0 (no ecological factors) to 4 (study included relational-, familial-, community- and societal-level influences). Fifty percent (\( n = 162 \)) of the studies had an index of 0, while the remaining 50% ranged from 1 to 3. Overall, the mean was 0.66 (SD = 0.75).

**Level of analysis**

Most of the studies (87%; \( n = 281 \)) were coded at the individual level of analysis. There were no studies at the systems level; thus, the remaining 13% (\( n = 43 \)) were coded as community–societal level. Of those at the higher level, 72% (\( n = 31 \)) utilized random sampling techniques.

**Sample composition**

The largest category (27.5%; \( n = 89 \)) was school-affiliated sample followed by clinics (20.7%; \( n = 67 \)), community (19.7%; \( n = 64 \)), society (17.6%; \( n = 57 \)), other (7.2%; \( n = 23 \)), detention centers or prisons (6.4%; \( n = 21 \)) and unable to determine (<1%). Most samples were recruited using non-random techniques (79%; \( n = 256 \)). A large majority (71.3%; \( n = 231 \)) of the samples were of mixed gender with 21.3% (\( n = 69 \)) being females only, 6.8% (\( n = 22 \)) were males only and <1% was unable to determine. Regarding the racial/ethnicity of the sample, 42.9% (\( n = 139 \)) were coded as diverse, 35.2% (\( n = 114 \)) were all or mostly minorities, 17.9% (\( n = 58 \)) were all or mostly White and 4% (\( n = 13 \)) were unable to determine.

**Behavioral, STD and pregnancy outcomes**

All the studies included some type of sexual behavior as the outcome variable; however, only 33% (\( n = 108 \)) of the studies included two behavioral outcome variables, 10% (\( n = 34 \)) included three behavioral outcome variables and only 3% (\( n = 10 \)) included four behavioral outcomes. Condom
use or lack of condom use was the most frequently measured behavioral outcome where it was measured in 39% \((n = 126)\) of the studies. Number of partners was the second most frequent \((23%; \ n = 74)\), followed by ‘sexual risk’ \((20%; \ n = 66)\), prevalence of ever engaging in sex \((14%; \ n = 45)\), age of sexual debut \((12%; \ n = 40)\), frequency of sex \((6%; \ n = 18)\) and age of sexual partner \(<1\%; \ n = 3\).

In 14.5% \((n = 47)\) of the studies, some measure of STD history or prevalence was included: 7.4% used a biomarker, while 7.1% utilized self-report. In 12% of the studies \((n = 39)\), a measure of pregnancy outcome was included: 2% used a biomarker and 10% used self-report.

**Bivariate analyses**

To determine whether the research was more inclusive of ecological factors over time, we conducted several bivariate analyses. We calculated a Pearson’s product moment correlation coefficient between publication year and ecological index. There was no relationship, \(r = 0.01, P = 0.84\). We also created a median split variable of the ecological index where 0 = no ecological factors and 1 = one or more factors. We then calculated a cross-tab between the dichotomous ecological variable and a cutoff variable that represented year of publication as 0 = before 2000 and 1 = 2000 or later. The results showed that prior to 2000, 46% \((n = 60)\) of the studies included environmental factors, whereas in the year 2000 or later, 53% \((n = 102)\) included environmental factors. This was not a significant difference, \(\chi^2 (N = 324, df = 1) = 1.55, P = 0.21\).

To determine whether level of analysis was related to ecological level, we calculated a cross-tab between the dichotomous ecological variable and a variable representing level of analysis \((0 = \text{individual}; \ 1 = \text{community–societal})\). The results showed that 67% \((n = 29)\) of the community-societal level of analysis studies \((n = 43)\) included environmental factors, whereas 47% \((n = 133)\) of the individual level of analysis studies \((n = 281)\) included environmental factors. This difference was significant, \(\chi^2 (N = 324, df = 1) = 6.03, P = 0.014\).

In contrast to this perspective, however, it was important to examine the level of analysis among those studies that did include environmental factors \((n = 162)\). Of those, 82% \((n = 133)\) remained at the individual level of analysis.

**Discussion**

This study fills an important gap in the STD and teen pregnancy prevention literature by providing a systematic analysis of 324 abstracts, published in a 17-year period that pertained to adolescents. The goal was to determine whether published research has undergone a shift from an individual-level perspective to an ecological perspective. We found that 50% of the studies analyzed were devoid of ecological factors. Thus, this finding supports the contention that taking an ecological approach has not been embraced to a large degree and that rhetoric may prevail. Also, we would have expected that there may have been a trend effect showing an increase in ecological approaches with passing years. Unfortunately, this was not observed over the 17-year period.

Even if we are to acknowledge the studies that did include environmental factors, a large majority (82%) of those remained at the individual level of analysis and also utilized non-random sampling. These are two important aspects of a research approach that utilizes an ecological perspective to understanding adolescent sexual risk behaviors and outcomes. Although many of these studies’ results showed an inclusion of ecological factors, they still must be viewed in terms of the level in which the measurements were made and furthermore, whether the ecological factors measured can be considered as characteristic of the larger collective from where the sample was drawn. The former issue involves fallacies, which are a problem of inference. It is always important to acknowledge that if a relationship between two factors is found at one level of analysis, this relationship may not necessarily hold at other levels. These results imply that the results from a majority of these studies that examined ecological factors but were at the individual level may not be applicable to higher levels such as an entire state or the entire United States. Regardless of the inclusion of ecological factors, it is important to
understand and consider the level at which the results are applicable especially when conceptualizing possible intervention strategies. For example, a relation observed between school connectedness and unprotected vaginal sex among a sample of individuals recruited from a local STD clinic may not be observed at a higher level such as the county level; thus, interventions seeking to modify school connectedness should stay focused at the local level before more research can be conducted.

Using data collected from individuals to characterize an entire group is a second but related issue in ecological analyses. Even if the study included ecological factors, if the data collected are obtained using non-random sampling techniques, then the results may not be characteristic of the higher level group from which the sample was drawn. This feature of a study may be more of a concern when the level of analysis is at a higher level. We found that most of the studies that were positioned at the community-societal level of analysis employed random sampling techniques.

The studies that did include ecological factors mostly focused on familial factors followed by community and then relational factors. From an ecological perspective, the family is located within the adolescents’ microsystem and theoretically exerts strong influence over their health-related behaviors, including their sexual health. Indeed, the research suggests that although peers and community-level factors exert a strong influence on adolescents, familial factors may also be substantial. Parents who are involved and who consistently maintain knowledge of their children’s day-to-day activities are said to be ‘monitors’ of their children’s whereabouts. In fact, much of the research on familial factors content analyzed in this study provides evidence to suggest that adolescents who perceive that their parents (or parent figure) know where they are and who they are with outside of school or work are substantially less likely to engage in sexual risk behaviors, to have a STD diagnosis and/or become pregnant [18, 38–44].

We are buoyed by the number of studies that examined community-level (23%) or societal-level (3%) factors. Overall, 26% of the studies included factors from these two levels. Significant factors at these levels include peer norms unsupportive of safe sex, low school connectedness, the media (e.g. x-rated content, rap videos) and poverty. The constructs of gender and race/ethnicity were also critically important societal factors. Gender and race/ethnicity are deemed as societal characteristics rather than individual characteristics because of the ways society constructs and attaches culture-bound conventions and roles. Gender and racial/ethnic roles vary across a continuum, within and across societies. Thus, when examining gender and race/ethnicity as ecological factors, we are referring to the sociological constructs rather than the biological. Some research has found that many of these societal factors correlate with STD, pregnancy or engaging in sexual risk behaviors, such as having multiple partners, not using condoms or higher frequency of sexual activity [47–57]. Many of these societal factors are amenable to change efforts, but clearly more research is needed that reveals how these factors interact with other factors and in turn influence behavior.

Relational factors, which also represent an environmental factor located within the adolescents’ microsystem, were included in only 13% of the studies. Because engaging in sex involves two people in some sort of relationship, it stands to reason that relational factors should play a pivotal role in adolescents’ decision to engage in sexual risk behaviors. Relational factors are especially important to examine when researching female adolescents in particular as many of these environmental influences (e.g. age of partner, relationship dynamics, perception of partner’s condom use, dating violence and date rape victimization) have direct effects on their sexual risk behaviors, STD and teen pregnancy outcomes [18, 45, 46]. Because of the direct influence of relational factors on adolescent sexual behavior, one would expect a higher percentage of studies to focus upon this level. This small percentage may be due to the sensitivity involved in asking adolescents questions pertaining to their sex partners. In addition, some researchers may question the validity of partner-reported data. Nevertheless, we suggest that this small percentage represents a rather large gap in this
body of literature. This result indicates that perhaps more studies should be conducted to better understand the relative influence of relational factors to adolescent sexual risk behavior and related outcomes.

It is important to note that 95% of the studies analyzed included an examination of individual characteristics, while half also included environmental factors; however, it is essential to an ecological approach that studies including both individual-level and environmental factors utilize analytic methods that place the focus upon the ‘transactions’ between persons and systems-level factors. This approach would be in contrast to an examination of the independent contributions of each variable only. We could not ascertain through this content analysis, which examined abstracts only, to what degree the analyses employed were complex analyses such as mediational analyses or inclusion of interaction terms to predict behavior and/or biological outcomes. In taking an ecological perspective, it is imperative that the ‘interrelationships’ of adolescents and systems are considered so that a more accurate picture of the social system as a whole is gleaned. We suggest that to get the full benefit of assessing both individual and societal level factors, a higher level of analysis that examines the interaction between adolescents and their environment are warranted.

When approaching the problem of adolescent sexual health, who is targeted can be equally as important as the nature and type of variables that are being examined. We found that adolescents were recruited from schools both locally and at the national level, clinics and community-based organizations. A small number of studies specifically targeted adolescents at risk, such as detained youth, homeless adolescents or gang members. Moreover, the samples were diverse in terms of race/ethnicity and gender. Thus, these results suggest that with a broad range in sample composition, many segments of the adolescent population are being reached and studied.

We acknowledge that there is high cost to and practical limitations of including biomarkers to measure STD and pregnancy outcomes. However, given that these are the two epidemics that need to be ameliorated, it was disconcerting that few studies included biomarkers. All studies should at a minimum include self-reported measures of these critical outcome variables. Unfortunately, we found that only 7% included ‘self-report’ of STD and 10% included self-report of pregnancy. If the goal is to reduce the morbidity associated with STDs and teen pregnancy, then without an examination of those outcomes, it is impossible to know precisely which behaviors should be targeted with an intervention.

We note several important limitations in our study. First, we describe this study as a content analysis of adolescent sexual health literature. We cannot be certain that the way in which we generated our sample was inclusive of all studies. Some studies may have been omitted. Second, our judgments are based on what we could glean from abstracts, which by definition provides only highlights. Most journals have strict word limitations that may prevent a description of all variables measured; however, based on our coding of a random sample of full text articles, we found that information for most of the major coding decisions was readily available and matched what was found in the full text article. Nevertheless, some abstracts may not have been a fair representation of the actual content. From 1990 through 2007, an extensive body of research on adolescent sexual health has been generated. Given that many researchers in the field advocate for an ecological perspective to enhance our understanding of the issue, their calls are being answered to some degree. A breadth of populations is being reached; yet, a larger proportion of the research needs to go beyond the individual level of analysis, utilize sampling methodologies that will enhance generalizability and incorporate multiple levels of environmental factors that are represented as interrelationships in the regression equations. This type of framework will be truly representative of an ecological approach and will advance our understanding of how to combat these two epidemics through coordinated multi-level interventions.
Conclusion

This article systematically analyzes the content of descriptive studies in adolescent sexual health and behavior research conducted during the past two decades. As researchers, health educators and other health care professionals become more aware of the necessity of adopting ecological perspectives that consider the role of contextual factors in providing a more comprehensive understanding of behavior to improve health education, it is important to periodically and systematically assess progress. This overview of the state of the science provides researchers, health educators and other health care professionals with direction for future research that will inform the development of interventions and health promotion efforts.

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References

24. Clark W, Serovich J. Twenty years and still in the dark? Content analysis of articles pertaining to gay, lesbian, and
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47. Aral SO. Understanding racial-ethnic and societal differentials in STI. *Sex Transm Infect* 2002; 78: 2–4.


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