PEDIATRICS PERSPECTIVES

The Need for Biological Outcomes to Complement Self-Report in Adolescent Research

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Adolescents' self-reported health behaviors inform medical care and serve as primary intervention outcome measures. Strategies to bolster the validity and reliability of self-report combined with objective biological markers of behavior are urgently needed. We illustrate such strategies within the context of adolescent sexual health research.

Research that informs human immunodeficiency virus (HIV) and sexually transmitted disease (STD) prevention efforts and public health policy involves many challenges. One key challenge is the accurate measurement of HIV risk behaviors, particularly sexual behaviors. Adolescent HIV risk reduction intervention trials have relied mainly on outcomes measured via participants' self-reports of past behavior to evaluate programmatic efficacy. Few trials have complemented participant self-report with biological measures of sexual behaviors (eg, laboratory-confirmed STDs). Indeed, of the 20 US Centers for Disease Control and Prevention evidence-based interventions for adolescents, only 4 have included biological outcomes as trial end points in addition to self-reported measures.[1]

Although adolescents' self-reported behaviors have been the most widely measured trial end points, the accuracy of self-report data may be affected by myriad factors, including the cognitive demands of recalling past behaviors and motivational biases that can lead adolescents to misreport behavior.[2] Furthermore, inconsistencies between self-reported sexual behaviors and biological end points raise questions about the validity of relying solely on self-report to evaluate the efficacy of HIV risk reduction interventions. Thus, a need exists to both improve the validity of self-report and to integrate biological markers of sexual risk behaviors into future adolescent HIV risk reduction interventions.

Motivational biases may result in distortion of self-reported past behaviors to avoid shame or embarrassment or to appear in a more favorable light.[3] Motivational biases may be particularly pertinent to HIV prevention research, in which it is commonly assumed that adolescents (especially female subjects) underreport sexual risk behaviors attributable to the sensitive, personal, and often times stigmatizing nature of such behaviors. Participation in an HIV risk reduction intervention may also increase social desirability bias, which results in underreporting of sexual behaviors. Thus, within the context of a randomized controlled trial,

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participants assigned to the HIV risk reduction condition may be more prone to underreport risk behaviors. This bias may be particularly problematic when data are collected via personal interviews. In addition to motivational biases, self-report inaccuracies may also be affected by cognitive factors, such as comprehension difficulties or inaccurate recall. Such errors may occur for a variety of reasons, including the length of required recall, frequency of the behaviors assessed, low literacy, or poor comprehension of sexual behavior questions.

There are a growing number of studies examining self-report validity by comparing self-reported behaviors with biological markers. Biological markers of sexual activity, including prostate-specific antigen (PSA) and Y-chromosome polymerase chain reaction (Yc-PCR), have been used to examine the validity of self-reported sexual intercourse and condom use. PSA is a protein in semen detectable in vaginal fluids; the Yc-PCR assay detects the presence of the Y chromosome in vaginal fluid.[4] Findings suggest that a subset of adolescent women who report either no sexual behavior or consistent condom use (ie, a condom used during each penile–vaginal sexual episode) have evidence of sperm in the vaginal fluid, suggesting either inaccurate self-report, condom use errors, or both. Incident STDs are also biological markers that are used as indicators of the validity of self-reported sexual behavior. For example, 1 study found that 15% of male and 23.5% of female adult STD clinic attendees who reported always using a condom tested positive for an STD.[5] Similarly, among adolescents enrolled in an HIV risk reduction intervention, 17% of those with a laboratory-confirmed STD (chlamydia, gonorrhea, or trichomonas) reported either lifetime abstinence or recent abstinence from vaginal sex.[6] Collectively, these studies highlight discrepancies between self-report and biological markers of sexual behavior.[4–6]

These findings underscore the need to both enhance the validity of adolescents' self-reports of sexual behavior and to integrate biological markers as end points into HIV risk reduction trials to provide an objective outcome for evaluating intervention efficacy. Biological markers including incident STD, pregnancy, PSA, and Yc-PCR are all potential end points that can be integrated into HIV risk reduction intervention trials. However, biological markers can signal risk behavior only during a recent time period (ie, past 14 days for Yc-PCR and 48 hours for PSA), and the diagnostic tests are costly, requiring specialized equipment to conduct the assays. In addition, some biological markers are applicable only to female subjects (eg, pregnancy, Yc-PCR). Moreover, STD transmission and pregnancy do not occur as a consequence of all unprotected sexual intercourse and, thus, are insufficient proxies for sexual risk behavior because they may underestimate the true prevalence of sexual risk. Furthermore, integrating STDs as a biomarker in HIV risk reduction intervention trials would not be feasible in populations with a low STD incidence or with small sample sizes and brief follow-up periods; these populations may yield inadequate statistical power to detect differences between trial conditions in STD incidence. Despite these potential limitations, biomarkers of sexual behavior are useful and are recommended, when appropriate and feasible, rather than relying solely on adolescents' self-reported sexual behavior.

Future research to improve the validity of self-report is also essential. A number of recommendations to improve reliability and validity of sexual health data have been suggested.[7] Recommendations to improve the validity of self-reported sexual behavior include techniques to improve recall (eg, providing anchor dates, use of timeline followback calendars, recall of memorable events during the reporting period), self-completed assessments such as audio computer-assisted self-interviews to reduce socially desirable responding, use of language that is easily understood, placing the burden of denial on the participant (eg, asking "how many times" rather than "if" a behavior occurred), and stressing the importance of accurate reporting for the development of programs to benefit others. Weinhardt et al[7] also recommended that sexual health surveys be designed with the assumption that respondents have misconceptions about sexual content and are likely to experience discomfort or difficulty responding to such questions. As such, future research should investigate methodologic strategies to address respondents' knowledge gaps regarding sexual health and to reduce their tendency to respond in a socially desirable fashion in line with perceived peer norms to avoid embarrassment or discomfort. For example, assessing adolescents' understanding of sexual behavior questions and clarifying any misunderstandings may increase the validity of self-reported behaviors. In addition, placement of sensitive sexual behavior questions toward the middle of the survey (in order from least to most threatening) may reduce participants' potential discomfort responding to these items and enhance self-report validity.

The use of validity checks of self-reported sexual behaviors both within and across multiple assessments may also improve data quality. In addition, use of assessment methods that enhance participants' anonymity (eg, participant identification numbers, computerized surveys) and providing confidentiality assurances may decrease socially desirable

responding.[2] Strategies should also be used to stress the importance of accurate reporting (eg, in questionnaire instructions) and provide repeated information regarding how study data will be used (eg, analyzing data across participants rather than examining individual responses). Given the time and fiscal investment in implementing a trial and the public health urgency to identify efficacious HIV risk reduction interventions for adolescents, improving the validity of self-reported sexual behavior data combined with integrated biological end points will improve researchers' abilities to accurately measure the efficacy of HIV risk reduction interventions. Furthermore, widespread use of biological markers will highlight STD/HIV transmission patterns and inform future prevention and treatment efforts.

ABBREVIATIONS

HIV: human immunodeficiency virus
PSA: prostate-specific antigen
STD: sexually transmitted disease
Yc-PCR: Y-chromosome polymerase chain reaction

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