

# Factors Associated with Evaluation of Contraception Options among University Undergraduates

Robert J. McDermott, Teri L. Malo, Virginia J. Dodd and Alyssa B. Mayer

## Abstract

The objective of this study was to examine attributes assigned by university undergraduates to 12 contraception options, determine if dimensions used to evaluate options differed for women and men, and assess whether these dimensions have changed over time. This study was cross-sectional and involved a written survey. The sample (N=792) was drawn from two large universities in the southeastern United States and data collection was completed in classroom settings. Students rated 12 methods on 40 semantic differential scales. Scale scores were summed and a principal components analysis was performed, yielding separate factor structures (evaluative dimensions) for men and women. Three factors emerged for women accounting for 40.85%, 8.00%, and 5.78% of the variance respectively. Three factors also emerged for men accounting for 37.39%, 8.51%, and 7.15% of the variance respectively. Manipulating item loading criteria increased factor interpretability. In contrast to some previous research, the interpretative schemes of men and women for assessing contraception options held more similarities than differences. This apparent confluence in evaluating contraception may facilitate improved negotiation and agreement about the eventual choice of methods.

## Background

“For most students, attending college is an exhilarating and liberating period in life” (Sawatzke, 2010-11). Aside from the pursuit of studies, prospective students’ anticipation of what to expect out of college or university life may include extracurricular activities such as partying, drinking, and engaging in sexual activity (Sawatzke, 2010-11). Such expectations may not deviate far from the truth. One study found that although 49% of the incoming freshman class had never participated in sexual intercourse, that proportion decreased to 28% by the spring semester of that year (Patrick, Maggs, & Abar, 2007). Sexual experience among students increases with time and class standing as 74% of freshmen, 84% of sophomores, 87% of juniors and 90% of seniors report being sexually active (Synovitz, Hebert, Carlson, & Kelley, 2005). Moore and Davidson (2000) indicate that the first sexual intercourse for half of college women is unplanned; moreover, other investigators report that for 27% of college women, that first experience takes place after drinking alcohol (Sprecher, Barbee, & Schwartz, 1995). Persons who participate in high risk sexual practices (e.g., unprotected sex, multiple partners, casual partners) and in coincidental risk behaviors such as alcohol use increase the probability of negative consequences such as sexually transmitted infections (STIs), unintended pregnancy, (Centers for Disease Control and Prevention [CDC], 2005; Henshaw, 1998; Weinstock, Berman, & Cates, 2004) and latent guilt feelings (Wayment & Aronsin, 2002). College women ages 20-24 have one of the highest rates of unintended pregnancy because of lack of contraceptive use and risky sexual practices (Bryant, 2009), yet more than 80% who are sexually active are *not* trying to get pregnant (Bryant, 2009). Approximately 12% of college students (women and men) report either experiencing or being involved in an unplanned pregnancy (McCarthy, 2002) and 52% report having had an unplanned pregnancy “scare” at least once (Miller, 2011a). For women who enroll in community college programs, about 61% who become pregnant after enrolling fail to complete their degree, a dropout rate 65% higher than for women who do not have children while attending college (U.S. Department of Education, 2002).

Consequently, preventing unintended pregnancy and reducing rates of STIs are important health objectives for the nation that may be met by encouraging the use of appropriate, acceptable, and effective contraception methods (HealthyPeople.gov, 2011). However, young adults’ attitudes and beliefs about contraception options derived from presumed attributes may influence acceptance or rejection of a particular method (Sarvela, Huetteman, McDermott, Holcomb, & Odulana, 1992; Tanfer & Rosenbaum, 1996).

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\*Robert J. McDermott, PhD; Research Fellow, Florida Prevention Research Center, Tampa, FL 33612; Phone: (813) 431-2200; Email: rmcdermo@verizon.net; Eta Sigma Gamma Member-at-Large

Teri L. Malo, MPH, PhD; Applied Research Scientist, H. Lee Moffitt Cancer Center & Research Institute; Cancer Prevention & Control Division, Department of Health Outcomes & Behavior, 12902 Magnolia Drive Tampa, FL 33612; Phone: (813) 745-8705; Email: teri.malo@moffitt.org; Eta Sigma Gamma - Delta Kappa Chapter

Virginia J. Dodd, PhD, MPH; Associate Professor, University of Florida College of Dentistry, Department of Community Dentistry and Behavioral Science, 1329 SW 16th Street, Room 5171, PO BOX 103628, Gainesville, FL 32610-3628. Phone: (352) 273-5971; Email: VDodd@dental.ufl.edu; Eta Sigma Gamma - Alpha Lambda Chapter

Alyssa B. Mayer, MPH; Graduate Research Assistant, Florida Prevention Research Center, Tampa, FL 33612. Phone: (321) 292-9289; Email: amayer@health.usf.edu; Eta Sigma Gamma - Delta Kappa Chapter

\* Corresponding Author

## Measurement of Presumed Attributes of Contraception Options

For many individuals, some words or constructs have both denotative (i.e., dictionary definition) and connotative (i.e., representational) meanings. Moreover, previous experience and preordained beliefs may help shape individuals' representational interpretations of words and, as a result, different people may assign contrasting connotative meanings to the same word (Osgood, Suci, & Tannenbaum, 1957). Connotative meanings assigned by individuals to particular constructs are sometimes determined using semantic differential scales (Osgood et al., 1957). Such scales have been used to study attitudes and reactions to health-related terms (Gold, Regin, McDermott, & Drolet, 1985; McDermott & Sarvela, 1999) including contraception (Kee & Darroch, 1981; McDermott & Gold, 1986; 1986-87; McDermott & Noland, 2004; Sarvela et al., 1992) and other sexuality issues (McDermott, Drolet, & Fetro, 1989; Westhoff, McDermott, Valentin de Sierra, Drolet, Fetro, & Joerg-Cole, 1999).

Research on connotative meanings assigned to contraception options has focused largely on traditional methods of birth control (McDermott & Gold, 1986; 1986-87; McDermott & Noland, 2004; Sarvela et al., 1992). Research examining connotative meanings assigned by college students to ten contraception options (condom, diaphragm, douche, female sterilization, IUD, male sterilization, oral contraceptive, rhythm, spermicide, and withdrawal) revealed contrasting evaluative factor structures or dimensionalities for women and men (McDermott & Gold, 1986; 1986-87). Other researchers (Sarvela et al., 1992) studied college students' attitudes concerning 13 contraception options (adding abstinence, the contraceptive sponge, and the vaginal suppository). Some investigators have focused exclusively on college students' semantic evaluation of the male condom and its relationship to condom use history, noting that more favorable attitudes were reported by students who had used a condom at least once (McDermott & Noland, 2004). Semantic or connotative examination of attitudes about contraception options can help researchers to: (1) track dimensions along which potential users assess contraception methods; (2) identify changes in attitudes over time; and (3) provide baseline attitudinal measures about newer contraception technologies that have not been evaluated systematically using semantic differential scales. Because previous research has indicated both sex differences (McDermott & Gold, 1986; 1986-87; Sarvela et al., 1992) and similarities (McDermott & Noland, 2004) in the semantic evaluation of contraception methods, further examination of semantic meaning among contemporary contraception alternatives is warranted.

Whereas a previously published paper (McDermott, Malo, Dodd, Daley, & Mayer, 2011) from the same data set looked at gender differences in evaluative indices assigned to contraception methods, the purposes of this study were to: (1) examine the attributes assigned by undergraduate students to 12 contraception methods; (2) determine the extent to which the dimensions (or factors) used to evaluate contraception methods differ for women and men; and (3) assess whether these dimensions have changed over time based on comparisons with similar instruments and audiences from earlier decades.

## Methods

### Choice of Measures

A semantic differential (i.e., bipolar adjective) scale estimates the connotative meaning of a term (construct) for an individual (Osgood et al., 1957). Sets of related scales can be summed to yield an overall score for a given construct. Kee and Darroch (1981) referred to these sum scores as 'acceptability scores' and other investigators have called them 'evaluative indices' (McDermott & Gold, 1986; 1986-87). Researchers have interpreted these scores as an estimate of a person's attitude toward the construct under consideration (Gold et al., 1985; Heise, 1970; Kidder, 1981; McDermott & Sarvela, 1999; Nunes, 2011; Osgood et al., 1957; Sukhai, Seedat, Jordaan, & Jackson, 2005). Semantic differential scales are easy and economical ways to study people's attitudes. Evidence of their validity, as well as flexibility and adaptability, comes from their applicability with both children and adults (Heise, 1970; U.S. Department of Education, 2002), and their validity across some languages and cultures (Heise, 1970; Kidder, 1981; Osgood, 1964, 1965; Westhoff et al., 1999).

### Instrument Development

The bipolar adjective word pairs selected were the 40 pairs presented (Table 1) by Kee and Darroch (1981) and used by other investigators, in whole (McDermott & Gold, 1986; 1986-87) or in part (Sarvela et al., 1992) to examine contraception attitudes. The specific contraception methods examined were solicited from students at the two participating universities as a mechanism for ensuring familiarity, contemporary relevance, and content validity. Whereas nine traditional methods of contraception emerged (abstinence, diaphragm, douche, female condom, female sterilization, male condom, male sterilization, oral contraceptive, and withdrawal) so did three options that would have been less familiar or unavailable at the time of prior investigations (e.g., Nuva ring, contraceptive patch, emergency contraception). Written instructions were adapted from instruments used in previous research (Noland, Daley, Drolet, Fetro, McCormack Brown, Hassell, & McDermott, 2004; Westhoff et al., 1999) to enable comparisons across groups and time. Thus, an instrument was created containing 12 contraception methods that were then rated by employing 40 bipolar adjective pairs scored on a seven-point scale from -3 to +3 with a 0 midpoint.

The instrument underwent two rounds of pilot testing to verify the clarity of written instructions, to illuminate concerns about familiarity with the contraception terms, and to assess test-retest reliability. Pearson test-retest correlations for the adjective pairs ranged from  $r = .48$  to  $r = .93$ , comparable to the range ( $r = .53$  to  $r = .92$ ) reported by other investigators using the same adjective pairs (McDermott & Gold, 1986; 1986-87). Although not all of these correlations were of ideal magnitude (e.g.,  $\geq .70$ ), all word pairs were retained to enable historic comparisons.

### Sampling Procedures and Data Collection

A convenience sample was drawn from undergraduate personal health courses at two large universities in the

Table 1

*Semantic Word Pairs for Evaluating 12 Contraception Options*


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uncomfortable - comfortable	inconvenient -convenient
obtrusive - unobtrusive	heavy - light
old-fashioned - modern	illegal - legal
unsuccessful - successful	distressful - non-distressful
difficult - easy	messy - non-messy
inflexible - flexible	bad - good
immoral - moral	embarrassing -non-embarrassing
unhealthy - healthy	unnatural - natural
abrasive - non-abrasive	temporary - permanent
harmful - harmless	obvious - discreet
cold - hot	unpleasurable - pleasurable
painful - painless	stressful - stress free
visible - invisible	unsafe - safe
frustrating - satisfying	insufficient - sufficient
inefficient - efficient	expensive - inexpensive
sad - happy	unacceptable -acceptable
unavailable - available	boring - exciting
ineffective - effective	foul - fragrant
stupid - clever	ugly - attractive
time consuming - quick	unreliable – reliable

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southeastern United States. Written surveys were completed by students in classroom settings during December 2006 and January 2007. Each class contained between 21 and 40 students. In all, 821 surveys were handed out to students. Surveys included written directions for completing the rating scales. Survey administration and data collection supervision were carried out by graduate assistants briefed about the study and survey protocol. Students had up to 50 minutes for completion. They could opt out of completing the survey (in which case, they simply would return a blank survey) without negative consequences for their grade or class standing. No

specific identifying information was sought. Returned surveys were placed in a large envelope to facilitate anonymity. All of the 821 surveys distributed were returned; however, 29 were blank and the remaining 792 were sufficiently completed to be used in analyses.

#### **Data Analysis**

Data were entered manually into an SPSS for Windows (2003) template. Descriptive analyses included frequencies and percentages. Adhering to the protocol established in

previous studies (Gold et al., 1985; McDermott & Gold, 1986-87; McDermott et al., 1989; Noland et al., 2004), scale scores were summed for men and women and principal components analysis (PCA) with varimax rotation (Abdi & Williamsn, 2010) was performed yielding separate factor structures (dimensions) for men and women. Eigenvalues  $\geq 1.0$  were used to assess the relative importance of the evaluative dimensions extracted. An adjective pair was initially linked to a particular factor if its loading for that evaluative dimension was .500 or greater and it uniquely loaded on a single factor (McDermott & Gold, 1986; 1986-87).

### Human Subjects' Approval Statement

The protocol for this study received expedited and separate approval by the institutional review boards of the respective universities.

## Results

### Demographics

Women comprised 69.2% (n=548) of respondents and men comprised 29.0% (n=230), with 1.8% (n=14) not specifying their sex. Participants' mean age was 19.28 years (range 18 to 29 years). A summary of demographic characteristics of the sample is provided in Table 2.

### Results of the Principal Components Analysis

Among women, there were three factors with eigenvalues  $\geq 1$  (Table 3). Factor 1 was comprised of 19 items accounting for 40.85% of the variance. Factor 2 encompassed 13 items accounting for 8.00% of the variance. Factor 3 consisted of three items accounting for 5.78% of the variance. Five adjective

Table 2

*Demographic Profile of Respondents to the Contraception – Semantic Differential Scale Survey*

Age		Mean = 19.28 Range = 18-29
Gender	Female	69.2%
	Male	29.0%
	Missing	1.8%
Race	White	61.4%
	Black	16.9%
	Asian	5.9%
	Other	10.7%
Hispanic or Latino	Yes	13.6%
	No	86.4%
Religion	Protestant	40.0%
	Catholic	28.2%
	Jewish	3.8%
	Other	10.9%
	None	14.1%
Sexual orientation	Heterosexual	93.2%
	Homosexual	2.5%
	Bisexual	2.1%
Marital status	Never married	91.0%
	Married	1.4%
	Divorced	0.5%
U.S. citizen	Yes	94.1%
	No	5.9%
Primary language is English	Yes	88.4%
	No	11.6%

Table 3

*Factor Loadings for Women's Evaluation of Contraception Options (Minimum Loading = .500)*

	Factor 1 (40.85%)		Factor 2 (8.00%)		Factor 3 (5.78%)
uncomfortable / comfortable	.730				
obtrusive / unobtrusive	.695				
difficult / easy	.655				
inflexible / flexible	.587				
abrasive / non-abrasive	.673				
painful / painless	.727				
frustrating / satisfying	.638				
sad / happy	.668				
time-consuming / quick	.650				
inconvenient / convenient	.642				
heavy / light	.571				
distressful / non-distressful	.608				
embarrassing / non-embarrassing	.541				
unnatural / natural	.629				
unpleasurable / pleasurable	.642				
stressful / stress-free	.617				
expensive / inexpensive	.531				
boring / exciting	.564				
ugly / attractive	.546				
unsuccessful / successful		.774			
immoral / moral		.594			
unhealthy / healthy		.700			
harmful / harmless		.619			
inefficient / efficient		.767			
ineffective / effective		.832			
stupid / clever		.695			
illegal / legal		.588			
bad / good		.672			
unsafe / safe		.802			
insufficient / sufficient		.752			
unacceptable / acceptable		.717			
unreliable / reliable		.813			
visible / invisible				.541	
temporary / permanent				.662	
obvious / discreet				.634	

pairs did not meet the .500 criterion to be included in any of the extracted factors.

Modifying the criterion for a factor loading sometimes can assist the interpretability (and therefore, utility) of that factor. For instance, when the item loading criterion was elevated from .500 to .640 for Factor 1 with women, ten items dropped out and an interpretation encompassing comfort (uncomfortable/comfortable; abrasive/non-abrasive; painful/painless; unpleasurable/pleasurable), convenience (obtrusive/unobtrusive; difficult/easy; inconvenient/convenient; time-consuming/quick;), and mood (sad/happy) emerged.

Leaving the structure of Factor 2 intact, an interpretation of safety-effectiveness emerges, but also the dimension of morality (immoral/moral; illegal/legal; bad/good). However, if one increases the stringency of the criterion to .700 for Factor 2,

a more limited but clearer interpretation of safety-effectiveness comprised of eight word pairs results (unsuccessful/successful; unhealthy/healthy; inefficient/efficient; ineffective/effective; unsafe/safe; insufficient/sufficient; unacceptable/acceptable; unreliable/reliable). One might interpret the three items comprising Factor 3 (visible/invisible; temporary/permanent; obvious/discreet) as describing privacy or discretion.

Three factors also emerged for men (Table 4). Factor 1 encompassed 19 items and accounted for 37.39% of the variance. Factor 2 consisted of 14 items and accounted for 8.51% of the variance. Factor 3 was comprised of five items and accounted for 7.15% of the variance. Three adjective pairs did not meet the .500 criterion to be included in any of the extracted factors.



## Discussion

Findings revealed the interpretative schemes for women and men were more similar than different with three factors emerging for each group. There was one strong factor for women and men alike with 40.85% and 37.39% of the variance accounted for respectively. This factor was dominated by attributes of comfort, convenience, and mood for both sexes, but with slight variation in the additional dimension (satisfaction) among men. The second strongest factor was comprised of virtually identical attributes (safety-effectiveness-morality) for women and men and accounted for similar amounts of variance (8.00% and 8.51% respectively). When the factor loading criterion was manipulated upwardly, the dimension of morality dropped out. A third factor was extracted for women and men, and it too had shared traits dominated by privacy/discretion.

Using the same 40 word pairs employed in this study, McDermott and Gold (1986) found five factors among 285 female university students (effectiveness-satisfaction, convenience, safety, natural-moral, modesty) and six factors for 316 of their male counterparts (effectiveness, comfort-pleasure-mood-convenience, acceptable-natural-moral, temperature, aesthetics, safety). Effectiveness was clearly the dominant factor for women and men alike but the other factors varied considerably in composition and complexity. As an illustration, no factor among female respondents was comprised of more than two dimensions. In contrast, at least two of the factors that emerged for men were difficult to assign simple descriptive labels to because of their having three and even four components. Moreover, these investigators found that certain dimensions had disparate levels of importance for women and men. For instance, safety was only the fifth strongest factor extracted among men; however, it was third in overall amount of variance accounted for among women. Differences in some of the factor structures among women and men were further magnified when race was considered (McDermott & Gold, 1986-87). For example, three "factors" among black women were not really interpretable because they were reduced to single attribute (i.e., single word pairs) which the authors described as "amorphous." In contrast, the three extracted factors for black men were so multidimensional that they defied use of interpretable labels. The two extracted factors for white men (effectiveness and pleasure-convenience) together accounted for 63.3% of the total variance. The two extracted factors for white women accounted for 65.7% of the total variance. Among white women the dominant factor (50.6%) included effectiveness but also aesthetics and convenience.

Using studies performed in the mid-1980s as a comparative baseline, there appears to have been a confluence between college women and men in the dimensions across which they assess contraception options. Notably, comfort, convenience, effectiveness, and safety are elements viewed similarly in relevance or importance by both sexes. The apparent confluence in the evaluative dimensions of contraception by women and men identified in the current study is further noteworthy. The domination of three constructs having similar factor structures for men and women offers the possibility that there is the potential for improved negotiation and agreement in the eventual choice of methods by sexual partners, especially ones who are unmarried, such as the vast majority

of participants in this study.

Perhaps more disconcerting is the finding that the dimensions contributing the largest amount of variance in the assessment of contraception options for both women and men appeared to be dominated by the elements of comfort and convenience, overshadowing a secondary factor comprised of safety and effectiveness. Whereas previous researchers found effectiveness to be the predominant factor for women and men in their study of university students (McDermott & Gold, 1986), it was a distant second place in the relative amount of variance accounted for in this 2006-07 cohort. In the 1990s, Cecil, Pinkerton, and Bogart (1999) found that aesthetics and effectiveness predicted women's intentions to use one particular contraception method, the female condom, with a primary sex partner. By comparison, men's intentions to use the female condom with a primary sex partner were predicted by their beliefs of its affordability, faith in its ability to prevent STIs, and trust in their partner's knowledge about its use.

Perhaps contraception technology has progressed to the point where effectiveness is assumed, thereby preventing it from taking on the same position of importance in contraception evaluation as two decades ago. That possibility notwithstanding, the study of meaning with respect to contraception options has some practical significance. Whether in the instructor-learner, patient-provider, or partner-partner exchange, understanding the idiosyncrasies or complexities of certain language constructs is an essential element of 21st century communication. What is noteworthy here are the evaluative dimensions along which young adults assess contraception options, particularly as they affect what some researchers have called communicative competence (Noland et al., 2004). Thus, conversations about contraception are likely to be more productive if they address the specific dimensions that are meaningful to this population. Whereas comfort and convenience emerged as the primary factors, potential users of contraception may need to be assured that a particular method meets these criteria. However, contraception methods still vary with respect to safety and effectiveness; therefore, if potential users believe that technology advances ensure these features similarly across methods, important educational messages to the contrary must be conveyed. For all health education or healthcare personnel, it may be important to realize that users' evaluation of various options does not occur in a one-dimensional way. Finally, the periodic monitoring of connotative meanings of contraception options offers an interesting method for identifying subtle responses of potential users of a particular method. Moreover, current findings, taken in conjunction with ones reported in earlier research using similar instrumentation, indicate fairly constant dimensions of evaluation reported by both men and women, albeit in evolving levels of importance with the passage of time. The emergence of similar dimensions (i.e., factors) offers ongoing evidence for the construct validity of the instrument.

## Study Limitations

This study is limited by its use of a convenience sample, responsible in part for the overrepresentation of women among respondents. Personal health courses are more popular on these campuses among women than among men. Whereas the distribution by sex is skewed, it is closely representative

of actual enrollment proportions for the courses used for recruiting the sample. A weighing procedure was considered for data interpretation but subsequently rejected. Consequently, the skewed nature of the sample may place some restrictions on the utility of the data. However, the analysis by gender minimizes some of that concern. Nevertheless, in the future, other sampling frames might be more fruitful to improve the clarity of the picture for a broader spectrum of young adults. Further, because the respondents were relatively young (mean age = 19.28 years) their actual familiarity with, and understanding of, as well as their user experience with many of the 12 contraception options presented is limited. The two universities in the study are both large (enrollments > 40,000 students), located in the same state, and positioned just 120 miles apart. These similarities notwithstanding, the pooling of surveys from the two institutions may have concealed possible institution-specific characteristics or confounded precision in the interpretation of these data. Moreover, none of the respondents were excluded because of sexual orientation, marital status, religion, absence of English language primacy, or other demographic characteristics, theoretically contributing to a modest amount of error in determination of the evaluative dimensions. In addition, the 12 contraception options were rated as independent entities – i.e., a combination method such as oral contraceptive + male condom was not an option that could be rated. Assessment of the attributes of combination methods (versus solitary methods) could produce alternative evaluative dimensions. The 40-item semantic differential scale, originally advanced by Kee and Darroch (1981) was 25 years old at the time this study was initiated. Possibly some of these word pairs have less relevance for or interpretability among college students today than in the 1980s. Also, this cross-sectional study represents only a snapshot in time. Finally, these data were collected more than six years ago. Whether the factors and factor loadings reported are the same as they would be if measured today is unknown. There was some obvious change in interpretative schemes for men and women from ones reported in previous decades; consequently, whereas the relevance of semantic meaning should be noted, the positive or negative valence (or neutrality) of meaning could still be in flux with the passage of additional time. The “age” or “shelf life” of data is not the same for all constructs or areas of measurement. However, the age of the data noted, the value to healthcare providers, health educators, and other contraceptive technology “gatekeepers” of examining connotative meanings and evaluative dimensions of contraception options should be apparent.

### Conclusions

These limitations notwithstanding, this investigation builds on other attempts to monitor and track attitudes about contraception options among college students, focusing in particular on some of the subtleties that may comprise perceptions and attitudes, and ultimately, influence choice, continuity of use, and effectiveness of methods. As other papers regarding collegiate audiences suggest (Fair & Vanyur, 2011; Hollub, Reece, Herbenick, Hensel, & Middlestadt, 2011; Miller, 2011b; von Sadovszky, 2011) the subject of attitudes about sexual risk taking and use of various contraception methods arouses substantial interest in college health service

personnel and among students themselves. Moreover, women’s contraception needs may change over time (Johnson, Pion, & Jennings, 2013) and knowledge deficits still persist among some groups (La Torre, Unim, Miccoli, Langiano, Ferrara, & De Vito, 2013). Better understanding of the dimensions across which potential users judge contraception methods may be beneficial in fostering communication between potential users and practitioners who provide advice concerning various options. Additionally, this information likely increases the capability of educators and practitioners to develop audience-focused, tailored programs and messages, thereby contributing to contraception literacy and wise decision making.

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