

Cognitive Development, Egocentrism, Self-Esteem, and Adolescent Contraceptive Knowledge, Attitudes, and Behavior

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Received August 11, 1992; accepted January 7, 1993

Cognitive development, egocentrism, and self-esteem were examined in relation to contraceptive knowledge, attitudes, and behavior. Subjects were 300 high school students and college freshmen (age range = 14–19 years) who completed a battery of self-report instruments. Based on multiple regression, analysis of covariance, and discriminant function analyses, findings revealed that adolescents who had higher scores on the cognitive development and self-esteem scales had more knowledge about sexuality and contraception and were more likely to report using contraception during sexual intercourse. Self-esteem was also predictive of more positive attitudes toward contraceptives. Subjects who reported using contraceptives had lower scores on the imaginary audience

Portions of this study were presented at the biennial meetings of the Society for Research in Child Development, Kansas City, Missouri, April 27–30, 1989. The authors wish to thank Mary Jo Rogers for her help in data reduction and data entry, Kay Knodt for her liaison work with participating schools, and Denise Durban for her comments on an earlier draft of this manuscript.

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egocentrism scale than did contraceptive nonusers. Gender-specific analyses revealed that females had significantly more knowledge about contraceptives than did males, but males had higher scores on the cognitive development and self-esteem scales than did females. In addition, self-esteem was predictive of contraceptive use for females but predictive of sexual activity for males. Implications for sex education programs are discussed.

INTRODUCTION

Although the majority of adolescents in both metropolitan and non-metropolitan areas are provided with information about different types of contraceptive techniques in school-based sex education classes (Zelnik and Kim, 1982), recent surveys of adolescent sexual behavior suggest that high percentages of adolescents fail to use contraceptives during sexual intercourse (Gans, 1990). Forty-two percent of sexually active females less than 15 years old and 35% of 15- to 17-year-olds delay use of contraceptives for a year or more after initiating sexual intercourse (Hofferth and Hayes, 1987; also see Landry *et al.*, 1986). Given such high rates of contraceptive nonuse, it is not surprising that nearly 50% of premarital adolescent pregnancies occur within the first 6 months of initiating sexual intercourse (Zabin *et al.*, 1979).

These rates are viewed as particularly problematic because adolescents who become pregnant are more likely than their nonpregnant peers to become dependent on public aid, to drop out of high school, and to become single parents (Gans, 1990). Moreover, this problem has been exacerbated because the proportion of adolescents who are sexually active before age 15 has increased steadily for the past 25 years for both white and African-American females (Hofferth *et al.*, 1987). Finally, the advent of acquired immune deficiency syndrome (AIDS), the likelihood that many cases of AIDS originate in adolescence, and the increasing rates of many other sexually transmitted diseases gives added reason to examine factors that underlie adolescent contraceptive nonuse (Brooks-Gunn and Furstenberg, 1989; Hein, 1989; Holmbeck *et al.*, 1990).

The tendency for adolescents to initiate sexual activity without employing contraception, despite educational efforts designed to prevent unprotected intercourse, has led numerous investigators to examine a host of potential predictors of contraceptive nonuse (e.g., demographic and social characteristics, individual differences variables such as problem-solving skills and locus of control, interpersonal relationship factors, media factors; see Balassone, 1991, Chilman, 1983, Katchadourian, 1990, Miller and Moore, 1990, and Morrison, 1985, for reviews). Although many of these variables have significant predictive utility for contraceptive nonuse during

adolescence, much of the research in this area has merely documented relations between single predictor variables and single behaviors and has tended to lack an integrative, developmental, or theoretical perspective (Balassone, 1991; Morrison, 1985). Given that adolescent contraceptive behaviors are likely to be determined by a host of interrelated personal, social, educational, and moderating factors, more complex models of such behaviors are needed. In response to these criticisms, a number of theory-driven models have been suggested (see Morrison, 1985, for a review), but unfortunately few have received empirical attention (Brooks-Gunn and Furstenberg, 1989). One area that has been described as "a relatively new and promising area for research in contraceptive use" (Morrison, 1985, p. 563) is the potential relationship between adolescent cognitive development and sexual behaviors (e.g., Gordon, 1990; Hill, 1980).

Several writers have suggested that one of the primary barriers to effective contraceptive use is the frequent mismatch between the cognitive developmental level of adolescents and the cognitive skills required in sexual decision-making situations (e.g., Chilman, 1983; Gilchrist and Schinke, 1987; Hamburg, 1986; Jorgensen, 1981). Many have also written specifically about the types of cognitive developmental functions that may be invoked during sexual decision making (e.g., Baizerman, 1977; Brooks-Gunn and Furstenberg, 1989; Coblner, 1974; Cvetkovich *et al.*, 1975; Jorgensen, 1981; Morrison, 1985; Smith *et al.*, 1982). Gordon (1990) argues, from a Piagetian perspective (Inhelder and Piaget, 1958), that four components of formal operational reasoning are relevant to adolescent decision making about contraceptives and pregnancy: envisioning alternatives, evaluating alternatives, perspective taking, and the ability to reason about chance and probability. Both the ability to generate alternative coping actions when faced with a sexual decision-making situation and the ability to make predictions about the possible outcomes of various sexual behaviors may be critical determinants of adolescents' sexual decisions. The ability to take the role of one's sexual partner in a nonegocentric manner may also be tied to the likelihood that one will employ contraceptive devices (Gordon, 1990). Finally, the degree to which an adolescent is able to employ probabilistic thinking may be negatively related to risk taking in sexual situations (Baizerman, 1977; Cvetkovich *et al.*, 1975; Gordon, 1990; Smith *et al.*, 1982).

A related set of cognitive abilities that has been used to explain adolescent contraceptive nonuse comes from the literature on adolescent egocentrism (e.g., Elkind, 1967; Lapsley, 1990). Adolescent egocentrism has been considered by some to be an index of unconsolidated formal operational thought and is, therefore, a cognitive developmental construct (e.g., Cvetkovich *et al.*, 1975). Two manifestations of adolescent egocentrism have been cited to explain sexual behavior: the imaginary audience and the per-

sonal fable. As suggested by Elkind (1967), early in the development of formal operations, young adolescents become increasingly able to reflect upon their own thinking as well as the thinking of others. Before these abilities have matured, however, the adolescent "fails to differentiate between the objects toward which the thoughts of others are directed and those which are the focus of his own concern" (Elkind, 1967, p. 1029). This lack of differentiation, according to Elkind, leads to the assumption for many adolescents that others are as concerned with their own thoughts, feelings, and behavior as they are themselves. The heightened self-consciousness that develops results in a sense of continually being evaluated by others, being "on stage," or playing to an "imaginary audience." Similarly, adolescents' failure to differentiate their feelings and experiences from reality may lead to the conviction, or "personal fable," that they are unusually unique and not subject to the laws that govern other peoples' lives (Elkind, 1967). (Since Elkind [1967] first discussed the imaginary audience and personal fable constructs, research on the topic has only partially supported Elkind's original formulation. As suggested by Lapsley [1990, 1991], past studies have not supported the notion that an increase in egocentrism occurs during the consolidation of formal operations. As an alternative to this earlier conceptualization, Lapsley offers a "new look" at the theory underlying these constructs [Lapsley and Rice, 1988]. In two recent studies, Lapsley and his colleagues found that increases in egocentrism during the adolescent period may be related to developmental changes in self-understanding as well as the separation-individuation process [Lapsley *et al.*, 1989; Lapsley *et al.*, 1988]. Lapsley [1990] also argues that imaginary audience and personal fable ideation is not necessarily an early adolescent phenomenon and will become evident whenever the adolescent [or adult] enters a particular stage of social cognitive development [Selman, 1980]. Although the theoretical basis for the constructs appears to be changing, the existence and nature of egocentric ideation has not been seriously questioned. Therefore, we would still maintain, for the purpose of this study, that the imaginary audience and personal fable constructs are likely to be predictive of adolescent sexual behaviors [Cvetkovich *et al.*, 1975; Jorgensen, 1981].)

With respect to relations between these constructs and adolescent contraceptive behaviors, Cvetkovich *et al.* (1975; also see Baizerman, 1977; Jorgensen, 1981) have suggested that the decision to purchase and use contraception is an admission to one's self and the imaginary audience that one is sexual and that one's sexual behaviors are premeditated. In addition, the belief that one is unique and invulnerable (i.e., the personal fable; Cvetkovich *et al.*, 1975; Elkind, 1967) may support the assumption among female adolescents that they will not become pregnant following sexual in-

tercourse or will only become pregnant following several episodes of intercourse.

Although there have been many discussions in the literature of potential relations between cognitive variables and contraceptive behaviors, there have been few empirical efforts in this area. In a study of African-American females attending family planning clinics, Sachs (1985) found that cognitive development, defined as performance on a four-digit permutation task, was the best predictor of contraceptive decision making. Similarly, Resnick and Blum (1985) found that the ability to adopt a future-time perspective was predictive of contraceptive behaviors. Regarding the effect of egocentric beliefs, Kantner and Zelnick (1973) found that roughly half of the adolescents who reported that they did not use contraception during their most recent intercourse believed that they were unable to conceive (Arnett, 1990).

A final construct that has recently been discussed from a cognitive-developmental perspective is the individual's sense of self-worth and perceived self-concept. As suggested by Harter (1990), one's concept of self becomes increasingly differentiated with age and there are links between self-concept and level of perspective taking and formal operational thought. With respect to sexual behaviors, Morrison (1985) concluded that self-esteem is related to contraceptive use in some situations, perhaps because those with higher self-esteem are more likely to acknowledge that they are sexual, are less in need of social approval, and are therefore less likely to feel self-conscious about using contraceptives (Herold *et al.*, 1979).

Most scholars who have discussed relations between cognitive development and contraceptive use have focused their discussions on contraceptive behaviors rather than on contraceptive knowledge and attitudes. As Jorgensen (1981) has argued, however, "certain cognitive skills are developmental prerequisites to adequate internalization and integration of information bearing on human sexuality and conception" (p. 44). The finding that many adolescents who have completed a sex education course come away with a poor understanding of sexuality and contraception (Hamburg, 1986; Morrison, 1985) suggests that there may be a poor fit between current forms of educational programming and the developmental level of most adolescents (Hamburg, 1986; Jorgensen, 1981). Thus, one implication of Jorgensen's perspective is that cognitive developmental level will not only have an effect on contraceptive *behaviors* but may also have an effect on the adolescent's ability to view contraceptive information as relevant—thereby impacting on the adolescent's *knowledge* and *attitudes* about contraception.

In the present investigation, cognitive development, egocentrism, and self-esteem were examined in relation to contraceptive knowledge, atti-

tudes, and behaviors in a sample of high school students and college freshmen. It was expected that subjects who had higher levels of self-esteem and cognitive development and lower levels of egocentrism would have more knowledge about contraception, more positive attitudes about contraception, and would be more likely to employ contraceptives during sexual intercourse. In this study, boys as well as girls were examined, given that the former are understudied in this literature (Bolton and MacEachron, 1988; Cvetkovich *et al.*, 1975). High school students were included because many of the studies in this literature have been conducted only with college students (Weddle *et al.*, 1988). College students were studied because many young people do not demonstrate formal operational thinking abilities until late adolescence or adulthood, with some never developing such abilities (Gordon, 1990). Finally, self-report of contraceptive behaviors was employed given past evidence that such self-reports are valid indicators of sexual behaviors for the majority of adolescents (Rodgers *et al.*, 1982).

METHOD

Subjects

Participants were 300 high school students and college freshmen (101 males, 199 females; 134 ninth graders, 51 eleventh and twelfth graders, and 115 college freshmen). Subjects ranged in age from 14 to 19 ($M = 16.35$, $SD = 1.60$). No gender differences in mean age were found at any of the grade levels. Seventy-seven percent of the sample were White, 10% were African-American, and 13% represented other ethnic groups. On the Duncan Socioeconomic Index (SEI; Duncan, 1977), an instrument designed to yield continuous rather than categorical information, scores based upon paternal occupation (or maternal occupation, in the case of single-parent households) ranged from 8.3 to 92.3 ($M = 58.62$, $SD = 21.52$). Given that the possible range of SEI scores is 3–96, the full range of SEI scores was represented in this sample. Questionnaires from 8% of the subjects ($n = 28$) were discarded due to a high number of incomplete or uncodable responses. All college freshmen attended an urban university, were enrolled in introductory psychology, and received course credit for their participation in the study. The preponderance of females in the college psychology classes accounted for most of the gender bias in the makeup of the total sample. High school students were enrolled in one of two suburban high schools. Parental permission was required for all high school participants.

Procedure

Subjects in all age groups were tested in groups of 25 or less with most subjects completing the packet of measures in 30–45 minutes. Due to the sensitive nature of some of the items in the questionnaires, subjects were told that anonymity would be maintained for all participants. Efforts were also taken to seat the subjects several chairs apart. All participating subjects signed informed consent blanks and were debriefed with a written or verbal description of the study.

Measures

Demographics

Subjects responded to a brief demographics questionnaire that included questions about age, grade, gender, ethnicity, and socioeconomic status.

Cognitive Development

The degree to which formal operational thinking was achieved was assessed with the 8-item Formal subscale of the paper-and-pencil "How is Your Logic?" Scale (HIYL; Gray, 1976; Gray and Hudson, 1984; Hudson and Gray, 1986). The full-length version of the HIYL consists of 13 items that are divided into Concrete (5 items) and Formal subscales and are based on the Piagetian stages of cognitive development (Inhelder and Piaget, 1958; Piaget and Inhelder, 1973). The Formal subscale includes items that measure the following: exclusion (4 items), combinatorial thought (i.e., combinations and permutations; 2 items), and probability reasoning (2 items). Responses to each of the Formal items are scored on a 7- or 8-point scale: (1) an indication that the item was too difficult; (2) preoperations; (3) preoperations–beginning concrete operations; (4) beginning concrete operations; (5) consolidated concrete operations; (6) consolidated concrete operations–beginning formal operations; (7) beginning formal operations; and (8) consolidated formal operations.

Scores on the items were summed to yield a single score that could range from 8 to 60. Two graduate students and one undergraduate student served as raters of the HIYL items and were trained using the manual provided by the developer of the measure (Gray, 1976). Rater agreement with an expert rater (the first author) on 10 subjects ranged from 81% to 88% ($M = 86\%$). Cronbach's coefficient alpha for the HIYL scale was .76.

The finding that HIYL scores increase with age (Gray and Hudson, 1984) attests to the construct validity of the scale.

Egocentrism

Given recent changes in the theoretical basis for the imaginary audience and personal fable constructs (Lapsley, 1990, 1991), Lapsley and his colleagues (Lapsley *et al.*, 1989) developed new measures of these variables: the New Imaginary Audience Scale (NIAS; 42 items) and the New Personal Fable Scale (NPFS; 46 items with three subscales: personal uniqueness, omnipotence, and invulnerability). The NIAS items are rated on a 4-point Likert-type scale (ranging from *never* to *often*) with respect to how often the individual thinks about the situations described in each item (e.g., "being admired because of how smart you are"). The NPFS items are true-false questions (e.g., "I can get away with things that other people can't"). Lapsley *et al.* (1989) found some support for the validity of these measures in a study where the NIAS and NPFS were correlated with subscales from a measure of separation-individuation.

Due to time constraints (i.e., the high school students were only permitted to participate for one 45-minute class period), shortened versions of these scales were used in the current study. Given the high alpha coefficients that have been reported for the NIAS (e.g., $\alpha = .92$, Lapsley *et al.*, 1989), 10 items were chosen randomly for the version employed in this study. Similarly, 6 items were chosen randomly from each of the three NPFS subscales to form an 18-item short version of the NPFS. Alphas for the NIAS and NPFS were .72 and .53, respectively. Given the relatively low alpha level for the NPFS scale, it was expected that correlations involving this scale would be attenuated somewhat. NPFS subscales were not used due to low subscale-specific alphas.

Self-Esteem

The Rosenberg Self-Esteem Scale (RSE; Rosenberg, 1979; $\alpha = .88$) consists of 10 self-statements concerning global self-worth (e.g., "I am able to do things as well as most people"). Subjects rated items on a 4-point Likert-type scale. The RSE is frequently used in the developmental literature, with findings attesting to its construct validity (Rosenberg, 1979).

Knowledge and Attitudes About Contraception and Sexuality

Contraception and sexuality attitudes and knowledge were assessed with a 69-item questionnaire developed by Eisen and Zellman (1986), which included the following five scales: Knowledge of Sexuality and Contraception Myths (alpha = .61; 17 true-false items that assess anatomy and physiology knowledge, venereal disease knowledge, and pregnancy and sexuality myths), Knowledge of Contraceptive Methods (alpha = .74; 10 items whereby subjects match 10 contraceptive methods with descriptions of each), Knowledge of Contraceptive Effectiveness (alpha = .72; 10 items where the effectiveness of the 10 contraceptive methods are ranked from 1 to 10), Knowledge of Venereal Disease Protection (alpha = .73; 10 yes-no items where the 10 contraceptive techniques are rated as to whether or not they protect the user from venereal disease [VD]), and Attitudes toward Contraception (alpha = .71; 22 Likert-type scale items; *strongly agree* to *strongly disagree*).

Correct responses to items measuring knowledge of myths, contraceptive methods, and VD were summed to yield total scale scores. Items from the Knowledge of Contraceptive Effectiveness scale were scored by computing the difference between the correct answer and the subject's answer as a measure of the degree that the subject's answer was incorrect. All items from the four knowledge scales were scored in the direction of greater knowledge. The Attitudes toward Contraception scale assessed the following issues: susceptibility to pregnancy and VD if no protective measures are taken (5 items), seriousness of pregnancy and responsible contraceptive behavior (4 items), interpersonal benefits of contraceptive usage (5 items), psychosocial and physical barriers to contraceptive usage (3 items), and ideological and structural barriers to contraceptive usage (5 items). Items from all attitudes subscales were combined into one attitudes scale due to low alpha levels for the separate subscales. Items were keyed in the direction of positive attitudes about contraception.

Contraceptive and Sexual Behaviors

Whether or not subjects had initiated sexual intercourse was assessed with the following question (based on items from Coles and Stokes, 1985, and Sorensen, 1973): "Have you ever had sex (vaginal intercourse) with a person of the opposite sex?" For those subjects who responded "yes" to this question, use of contraception was assessed with a yes-no question. Unfortunately, school administrators would not permit a more detailed assessment of these behaviors. In the present study, 165 reported that they

had not had intercourse (47 males, 118 females). Of the 135 participants who reported that they had had intercourse, 113 reported use of contraception (48 males, 65 females) and 22 reported that they had not used contraception (6 males, 16 females).

RESULTS

The results section will be subdivided into the following subsections: (a) Preliminary Analyses, (b) Gender differences, (c) Prediction of Knowledge and Attitudes About Sexuality and Contraception, and (d) Prediction of Sexual and Contraceptive Behaviors.

Preliminary Analyses

Pearson correlations among the cognitive-developmental, egocentrism, and self-esteem scales were computed to determine the degree of overlap among these predictor variables. Findings revealed little overlap among the variables, with absolute values of correlations ranging from .02 to .34 ($M = .14$; maximum amount of variance accounted for among any pair of variables = 12%). Similarly, Pearson correlations among the sexuality and contraceptive knowledge and attitudes scales revealed little overlap among these variables as well (range = .11-.44; $M = .23$; maximum amount of variance accounted for among any pair of variables = 19%). Thus, all variables were employed in their original form.

It was also possible that any significant relations between the cognitive development scale and the sexuality and contraception knowledge outcomes could be attributed to academic abilities rather than to actual cognitive development. That is, it may be that those subjects who were better students may have performed at a higher level on the cognitive scale *and* learned more in their sex education classes. To determine whether such academic performance effects were operating, the regression analyses involving the four knowledge scales (see below) were run after first controlling for each subject's grade point average (GPA). Because GPA information was only available for the high school freshmen ($n = 134$), analyses were only conducted on this subsample. Although cognitive development and GPA were moderately, but significantly, correlated ($r = .28$, $p < .001$), regression findings revealed that in all analyses where the cognitive development scale was a significant predictor (i.e., in two of the four analyses involving the knowledge variables for this subsample), the effects were still significant after controlling for GPA. Thus, it appears that relations between the HIYL scale and the knowledge variables cannot be at-

tributed solely to academic ability. As a result, GPA was not employed in subsequent analyses.

Gender Differences

Differences between males and females across the independent and dependent variables were assessed via *t* tests. Sample means for the full sample and for the male and female subsamples are provided for each variable in Table I. Findings revealed that males scored significantly higher than females on the cognitive development scale [$t(298) = 2.86, p < .01$] and the Rosenberg (1979) self-esteem scale [$t(298) = 3.51, p < .001$]. Females scored higher than males on the following scales: Knowledge of Contraceptive Methods [$t(298) = -2.49, p < .01$], Knowledge of Contraceptive Effectiveness [$t(298) = -2.83, p < .01$], and Attitudes toward Contraception [$t(298) = -2.17, p < .05$]. No gender differences were found for the other scales.

Prediction of Knowledge and Attitudes About Sexuality and Contraception

The predictive utility of cognitive development, egocentrism, and self-esteem for knowledge and attitudes about sexuality and contraception was evaluated with stepwise multiple regression analyses after controlling for the demographic control variables (age, socioeconomic status, and race; gender was also employed as a control variable in analyses involving the full sample). All significant effects ($p < .05$) for the full sample and for the male and female subsamples are presented in Table II (along with the corresponding beta weights, to indicate the direction of each effect).

For Knowledge of Sexuality and Contraceptive Myths, self-esteem and cognitive development were both significant predictors in a positive direction for the full sample and for females (see Table II). For females, imaginary audience scores were also positively predictive. For males, none of the independent variables were significant predictors. For Knowledge of Contraceptive Methods, cognitive developmental level was a significant positive predictor for the full sample and for both gender-specific samples. The analyses for Knowledge of Contraceptive Effectiveness revealed that self-esteem was a significant positive predictor for the full sample and the female subsample. Moreover, for the full sample, cognitive development scores and scores on the imaginary audience scale were significant positive predictors. For Knowledge of Venereal Disease Protection, cognitive development was significantly predictive in a positive direction for the full

Table I. Gender Differences and Means and Standard Deviations for all Variables^a

| Variable | Full Sample (<i>n</i> = 300) | Males (<i>n</i> = 101) | Females (<i>n</i> = 199) |
|--|----------------------------------|----------------------------|------------------------------|
| Cognitive Development | | | |
| <i>M</i> | 34.59 | 37.07 | 33.34 ^c |
| <i>SD</i> | 10.83 | 12.16 | 9.88 |
| Imaginary Audience | | | |
| <i>M</i> | 25.27 | 24.97 | 25.42 |
| <i>SD</i> | 4.79 | 4.85 | 4.77 |
| Personal Fable | | | |
| <i>M</i> | 30.22 | 30.56 | 30.04 |
| <i>SD</i> | 2.39 | 2.38 | 2.38 |
| Self-Esteem | | | |
| <i>M</i> | 31.55 | 32.96 | 30.84 ^d |
| <i>SD</i> | 5.03 | 4.42 | 5.18 |
| Knowledge of Sexuality and Contraceptive Myths | | | |
| <i>M</i> | 10.26 | 10.10 | 10.34 |
| <i>SD</i> | 2.64 | 2.61 | 2.66 |
| Knowledge of Contraceptive Methods | | | |
| <i>M</i> | 8.70 | 8.37 | 8.87 ^c |
| <i>SD</i> | 1.68 | 1.85 | 1.57 |
| Knowledge of Contraceptive Effectiveness | | | |
| <i>M</i> | 38.93 | 37.15 | 39.83 ^c |
| <i>SD</i> | 7.86 | 8.15 | 7.57 |
| Knowledge of Venereal Disease Protection | | | |
| <i>M</i> | 7.42 | 7.50 | 7.38 |
| <i>SD</i> | 1.75 | 1.49 | 1.87 |
| Attitudes toward Contraception | | | |
| <i>M</i> | 68.08 | 66.96 | 68.64 ^b |
| <i>SD</i> | 6.38 | 6.59 | 6.21 |

^aThe *t* tests were for comparisons of males vs. females.

^b*p* < .05.

^c*p* < .01.

^d*p* < .001.

sample and for males. Finally, for Attitudes about Contraception, self-esteem was positively predictive for the full sample and for the male and female subsamples.

Prediction of Sexual and Contraceptive Behaviors

Discriminant function analyses were conducted to determine whether the variables employed in this study were significantly predictive of sexual and contraceptive behaviors (i.e., initiation of sexual intercourse and use of contraception in those subjects who had had intercourse). In these analy-

Table II. Predicting Sexuality and Contraceptive Knowledge and Attitudes^a

| Step | Full Sample (n = 300) | | | | Males (n = 101) | | | | Females (n = 199) | | | |
|--|-----------------------|------|-----------------------|----------|-----------------|-----------------------|-----------|------|-----------------------|-----------|------|-----------------------|
| | Variable | Beta | R ² change | Variable | Beta | R ² change | Variable | Beta | R ² change | Variable | Beta | R ² change |
| Knowledge of Sexuality and Contraceptive Myths | | | | | | | | | | | | |
| 1 | Demog | — | .01 | Demog | — | .00 | Demog | — | .02 | Demog | — | .02 |
| 2 | Self-Est | .28 | .07 ^d | | | | Cog-Dev | .36 | .12 ^d | Cog-Dev | .36 | .12 ^d |
| 3 | Cog-Dev | .25 | .05 ^d | | | | Self-Est | .28 | .07 ^d | Self-Est | .28 | .07 ^d |
| 4 | | | | | | | Imag-Audi | .14 | .02 ^b | Imag-Audi | .14 | .02 ^b |
| Knowledge of Contraceptive Methods | | | | | | | | | | | | |
| 1 | Demog | — | .02 | Demog | — | .00 | Demog | — | .01 | Demog | — | .01 |
| 2 | Cog-Dev | .35 | .11 ^d | Cog-Dev | .46 | .20 ^d | Cog-Dev | .27 | .07 ^d | Cog-Dev | .27 | .07 ^d |
| Knowledge of Contraceptive Effectiveness | | | | | | | | | | | | |
| 1 | Demog | — | .05 ^c | Demog | — | .03 | Demog | — | .05 ^b | Demog | — | .05 ^b |
| 2 | Self-Est | .15 | .02 ^c | | | | Self-Est | .23 | .05 ^d | Self-Est | .23 | .05 ^d |
| 3 | Imag-Audi | .13 | .01 ^b | | | | | | | | | |
| 4 | Cog-Dev | .12 | .01 ^b | | | | | | | | | |
| Knowledge of Venereal Disease Protection | | | | | | | | | | | | |
| 1 | Demog | — | .03 ^b | Demog | — | .00 | Demog | — | .06 ^c | Demog | — | .06 ^c |
| 2 | Cog-Dev | .19 | .03 ^c | Cog-Dev | .36 | .12 ^d | | | | | | |
| Attitudes toward Contraception | | | | | | | | | | | | |
| 1 | Demog | — | .05 ^c | Demog | — | .12 ^c | Demog | — | .02 | Demog | — | .02 |
| 2 | Self-Est | .28 | .07 ^d | Self-Est | .31 | .09 ^d | Self-Est | .26 | .07 ^d | Self-Est | .26 | .07 ^d |

^aBeta = standardized regression coefficient (indicates direction of effect; not possible to compute for demographic control variables because these variables were entered as a cluster), R² change = R² change for a given variable at the step that it entered the equation. Demog, demographic control variables; Self-Est, self-esteem; Cog-Dev, cognitive development; Imag-Audi, imaginary audience. Only variables that were significant predictors (p < .05) are included in the table.

^bp < .05.

^cp < .01.

^dp < .001.

Table III. Initiating Sexual Intercourse: Means and Standard Deviations for Discriminant Analysis Predictor Variables and *F* Ratios for ANCOVA Significance Tests

| Variable | Full Sample | | | Males | | | Females | | |
|-----------------------|--------------------------|-----------------------------|-------------------------|-------------------------|-------------------------|-----------------------------|---------|--|--|
| | Sex (<i>n</i> = 135) | No sex (<i>n</i> = 165) | Sex (<i>n</i> = 54) | Sex (<i>n</i> = 47) | Sex (<i>n</i> = 81) | No sex (<i>n</i> = 118) | | | |
| Age | | | | | | | | | |
| <i>M</i> | 17.02 | 15.08 | 17.13 | 16.06 | 16.95 | 15.69 | | | |
| <i>SD</i> | 1.46 | 1.49 | 1.49 | 1.48 | 1.46 | 1.49 | | | |
| <i>F</i> | 50.59 ^c | | | 12.91 ^c | | 34.79 ^c | | | |
| Socioeconomic Status | | | | | | | | | |
| <i>M</i> | 57.12 | 59.85 | 59.33 | 58.66 | 55.64 | 60.33 | | | |
| <i>SD</i> | 21.67 | 21.38 | 19.71 | 22.87 | 22.88 | 20.84 | | | |
| <i>F</i> | 1.20 | | | .02 | | 2.24 | | | |
| Cognitive Development | | | | | | | | | |
| <i>M</i> | 36.41 | 33.10 | 38.17 | 35.81 | 35.25 | 32.02 | | | |
| <i>SD</i> | 11.32 | 10.20 | 12.06 | 12.27 | 10.72 | 9.08 | | | |
| <i>F</i> | 1.21 | | | .03 | | 1.70 | | | |
| Imaginary Audience | | | | | | | | | |
| <i>M</i> | 24.85 | 25.61 | 23.98 | 26.11 | 25.43 | 25.41 | | | |
| <i>SD</i> | 4.70 | 4.86 | 5.21 | 4.17 | 4.26 | 5.11 | | | |
| <i>F</i> | .04 | | | 4.28 ^a | | 1.72 | | | |
| Personal Fable | | | | | | | | | |
| <i>M</i> | 30.26 | 30.18 | 30.64 | 30.48 | 30.01 | 30.05 | | | |
| <i>SD</i> | 2.36 | 2.41 | 2.39 | 2.39 | 2.33 | 2.42 | | | |
| <i>F</i> | .02 | | | .10 | | .01 | | | |
| Self-Esteem | | | | | | | | | |
| <i>M</i> | 32.38 | 30.88 | 34.18 | 31.56 | 31.18 | 30.61 | | | |
| <i>SD</i> | 4.81 | 5.13 | 4.03 | 4.48 | 4.93 | 5.36 | | | |
| <i>F</i> | 3.99 ^a | | | 9.34 ^b | | .22 | | | |

| | | | | | | | | | |
|--|-------|--------------------|-------|-------------------|-------|--------------------|--|--|--|
| Knowledge of Sexuality and Contraceptive Myths | | | | | | | | | |
| <i>M</i> | 10.72 | 9.88 | 10.48 | 9.66 | 10.88 | 9.97 | | | |
| <i>SD</i> | 2.57 | 2.64 | 2.68 | 2.50 | 2.51 | 2.71 | | | |
| <i>F</i> | | 7.96 ^b | | 2.91 | | 4.89 ^a | | | |
| Knowledge of Contraceptive Methods | | | | | | | | | |
| <i>M</i> | 8.97 | 8.48 | 8.54 | 8.17 | 9.26 | 8.61 | | | |
| <i>SD</i> | 1.52 | 1.78 | 1.91 | 1.77 | 1.12 | 1.78 | | | |
| <i>F</i> | | 7.07 ^b | | 1.04 | | 7.05 ^b | | | |
| Knowledge of Contraceptive Effectiveness | | | | | | | | | |
| <i>M</i> | 40.39 | 37.74 | 38.04 | 36.13 | 41.96 | 38.38 | | | |
| <i>SD</i> | 7.28 | 8.13 | 8.84 | 7.23 | 5.54 | 8.41 | | | |
| <i>F</i> | | 5.95 ^a | | .89 | | 5.84 ^a | | | |
| Knowledge of Venereal Disease Protection | | | | | | | | | |
| <i>M</i> | 7.87 | 7.05 | 7.68 | 7.28 | 8.00 | 6.96 | | | |
| <i>SD</i> | 1.13 | 2.06 | 1.31 | 1.65 | .97 | 2.20 | | | |
| <i>F</i> | | 14.75 ^c | | 2.57 | | 13.09 ^c | | | |
| Attitudes toward Contraception | | | | | | | | | |
| <i>M</i> | 69.66 | 66.78 | 68.61 | 65.08 | 70.37 | 67.46 | | | |
| <i>SD</i> | 6.04 | 6.37 | 5.67 | 7.12 | 6.22 | 5.94 | | | |
| <i>F</i> | | 15.99 ^c | | 9.27 ^b | | 7.56 ^b | | | |

^a*p* < .05.

^b*p* < .01.

^c*p* < .001.

ses, sexual and contraceptive behaviors were dichotomous variables (i.e., subjects either reported "yes" or "no"). The following variables were employed as independent variables: demographics (gender, age, race, and socioeconomic status), cognitive development, egocentrism (imaginary audience and personal fable), self-esteem, knowledge about sexuality and contraception (four scales), and attitudes about contraception.

For both behaviors and for the full, male, and female samples, the discriminant analyses were significant, as indicated by the following: full sample/initiation of sexual intercourse ($\chi^2[13] = 82.67, p < .001$), male sample/initiation of sexual intercourse ($\chi^2[12] = 30.74, p < .01$), female sample/initiation of sexual intercourse ($\chi^2[12] = 56.94, p < .001$), full sample/use of contraception ($\chi^2[13] = 38.52, p < .001$), male sample/use of contraception ($\chi^2[12] = 23.48, p < .05$), and female sample/use of contraception ($\chi^2[12] = 26.43, p < .01$). The number of subjects that were classified correctly in each of these discriminant function analyses ranged from 67.33% to 90.71% ($M = 76.46\%$; percentage expected by chance = 50%). (A table of pooled within-groups correlations between discriminating variables and the canonical discriminant function for each of the discriminant analyses can be obtained from the first author upon request.)

Given that all discriminant function analyses were significant, univariate analysis of covariance (ANCOVA) findings are reported in Tables III and IV for initiation of sexual intercourse and use of contraception, respectively. Demographic control variables were employed as covariates prior to testing the main effects for sexual or contraceptive behavior. For initiation of sexual intercourse, those subjects in the full sample and in the male and female subsamples who had initiated intercourse were older and had more positive attitudes about contraception (see Table III). For the female and full samples, those subjects who had initiated intercourse had higher scores on all four of the sexuality and contraception knowledge scales. Self-esteem was higher for those who had initiated intercourse in both the full and male samples and imaginary audience scores were lower for those who had had intercourse in the male sample. Because gender and race were also included in the discriminant analyses (with gender being included only in the analyses involving the full sample), chi-square analyses were conducted to determine if initiation of sexual intercourse was more common for males vs. females or for white subjects vs. subjects from other ethnic groups. Results of chi-square analyses revealed that males were more likely than females to report having had intercourse ($\chi^2[1] = 3.91, p < .05$), a finding that is consistent with previous work (Gans, 1990). For the full sample and for the female sample, nonwhite subjects were more likely than white subjects to report having had sexual intercourse ($\chi^2[1] = 4.22, p < .05$; $\chi^2[1] = 3.74, p < .05$, respectively). Nonwhite males were not

more likely than white males to report having had sexual intercourse ($\chi^2[1] = 1.13, p > .05$).

Those in the full sample who reported using contraceptives had lower scores on the imaginary audience scale and higher scores on the cognitive development scale (see Table IV). Those from the full and female samples who had used contraceptives reported that they were older, had higher levels of self-esteem, had more knowledge of contraceptive effectiveness, and had more positive attitudes about contraception. Males who had reported using contraceptives also reported more knowledge about sexuality and contraceptive myths. Finally, chi-square analyses revealed that males were not more or less likely than females to report that they had used contraception ($\chi^2[1] = 1.20, p > .05$). For the full, male, and female samples, nonwhite subjects did not differ from white subjects in the use of contraception ($\chi^2[1] = .35, p > .05$; $\chi^2[1] = 1.89, p > .05$; $\chi^2[1] = .00, p > .05$, respectively).

DISCUSSION

In this study, cognitive development, egocentrism, and self-esteem were examined in relation to contraceptive knowledge, attitudes, and behavior. In general, results supported the hypothesis that adolescents who reported higher levels of cognitive development and self-esteem and lower levels of egocentrism would have more contraceptive knowledge, be more likely to report the use of contraception during sexual intercourse, and have more positive attitudes about contraception. More specifically, for the full sample, cognitive development was positively related to all four knowledge variables as well as the tendency to report using contraception. Self-esteem was positively related to two of the knowledge variables, the tendency to use contraception, and positive attitudes toward contraception. Contrary to predictions, imaginary audience scores were positively related to knowledge of contraceptive effectiveness. On the other hand, and consistent with predictions, subjects who reported using contraceptives were more likely to report lower levels of imaginary audience ideation. For the full sample, it was also found that adolescents who reported having initiated intercourse reported significantly higher levels of self-esteem, more contraceptive and sexuality knowledge, and more positive attitudes about contraceptives. A number of gender-specific findings also emerged.

The finding that cognitive development was related to knowledge about contraception, even after controlling for GPA, suggests that the amount of information about contraception that adolescents are able to recall is related to their ability to generate alternatives and reason about

Table IV. Using Contraception: Means and Standard Deviations for Discriminant Analysis Predictor Variables and F Ratios for ANCOVA Significance Tests

| Variable | Full Sample | | | Males | | | Females | | |
|-----------------------|---------------------|-----------------------|--------------------|----------------------|--------------------|-----------------------|---------|--|--|
| | Contra (n = 113) | No contra (n = 22) | Contra (n = 48) | No contra (n = 6) | Contra (n = 65) | No contra (n = 16) | | | |
| Age | | | | | | | | | |
| M | 17.18 | 16.18 | 17.25 | 16.17 | 17.14 | 16.18 | | | |
| SD | 1.37 | 1.68 | 1.39 | 2.04 | 1.37 | 1.60 | | | |
| F | 9.13 ^b | | 2.91 | | 5.80 ^a | | | | |
| Socioeconomic Status | | | | | | | | | |
| M | 58.26 | 51.21 | 60.68 | 48.57 | 56.48 | 52.20 | | | |
| SD | 22.26 | 17.58 | 19.03 | 23.56 | 24.36 | 15.61 | | | |
| F | 1.97 | | 2.05 | | .45 | | | | |
| Cognitive Development | | | | | | | | | |
| M | 37.59 | 30.36 | 39.25 | 29.50 | 36.37 | 30.69 | | | |
| SD | 11.47 | 8.43 | 12.15 | 7.31 | 10.87 | 9.02 | | | |
| F | 3.87 ^a | | 2.53 | | 2.04 | | | | |
| Imaginary Audience | | | | | | | | | |
| M | 24.44 | 26.95 | 23.60 | 27.00 | 25.06 | 26.94 | | | |
| SD | 4.78 | 3.63 | 5.31 | 3.16 | 4.29 | 3.89 | | | |
| F | 4.22 ^a | | 3.59 | | 1.58 | | | | |
| Personal Fable | | | | | | | | | |
| M | 30.32 | 29.94 | 30.67 | 30.33 | 30.07 | 29.80 | | | |
| SD | 2.37 | 2.35 | 2.21 | 3.83 | 2.47 | 1.67 | | | |
| F | .36 | | .15 | | .21 | | | | |
| Self-Esteem | | | | | | | | | |
| M | 32.92 | 29.61 | 34.18 | 34.17 | 31.98 | 27.90 | | | |
| SD | 4.48 | 5.58 | 4.00 | 4.62 | 4.60 | 5.00 | | | |
| F | 7.19 ^b | | .28 | | 8.76 ^b | | | | |

| | | | | | | | | |
|--|-------|--------------------|-------|-------------------|-------|-------|-------------------|--|
| Knowledge of Sexuality and Contraceptive Myths | | | | | | | | |
| <i>M</i> | 10.89 | 9.82 | | | | | | |
| <i>SD</i> | 2.45 | 3.03 | | | | | | |
| <i>F</i> | | 3.03 | | | | | | |
| Knowledge of Contraceptive Methods | | | | | | | | |
| <i>M</i> | 9.02 | 8.73 | | | | | | |
| <i>SD</i> | 1.52 | 1.55 | | | | | | |
| <i>F</i> | | .58 | | | | | | |
| Knowledge of Contraceptive Effectiveness | | | | | | | | |
| <i>M</i> | 40.96 | 37.45 | | | | | | |
| <i>SD</i> | 7.06 | 7.84 | | | | | | |
| <i>F</i> | | 3.80 ^a | | | | | | |
| Knowledge of Venereal Disease Protection | | | | | | | | |
| <i>M</i> | 7.89 | 7.77 | | | | | | |
| <i>SD</i> | 1.09 | 1.34 | | | | | | |
| <i>F</i> | | .28 | | | | | | |
| Attitudes toward Contraception | | | | | | | | |
| <i>M</i> | 70.44 | 65.67 | | | | | | |
| <i>SD</i> | 5.60 | 6.76 | | | | | | |
| <i>F</i> | | 13.66 ^c | | | | | | |
| | | | 10.83 | 7.67 | 10.94 | 10.62 | | |
| | | | 2.55 | 2.06 | 2.40 | 2.99 | | |
| | | | | 9.10 ^b | | | .02 | |
| | | | 8.69 | 7.33 | 9.26 | 9.25 | | |
| | | | 1.86 | 2.06 | 1.16 | .93 | | |
| | | | | 1.56 | | | .03 | |
| | | | 38.55 | 34.00 | 42.75 | 38.75 | | |
| | | | 8.67 | 10.02 | 4.94 | 6.78 | | |
| | | | | .20 | | | 5.18 ^a | |
| | | | 7.73 | 7.33 | 8.02 | 7.94 | | |
| | | | 1.36 | .82 | .82 | 1.48 | | |
| | | | | .25 | | | .02 | |
| | | | 69.09 | 64.72 | 71.44 | 66.02 | | |
| | | | 5.73 | 3.36 | 5.33 | 7.72 | | |
| | | | | 3.49 | | | 9.30 ^b | |

^a*p* < .05.

^b*p* < .01.

^c*p* < .001.

probability. This finding is consistent with Gordon's (1990) speculations regarding the relationship between formal reasoning and adolescent decision-making about contraception. Gordon maintains that those who are able to perceive the multitude of sexual and contraceptive options that are available to them *and* foresee the risks entailed in their sexual behaviors may be more likely to view information about sexuality and contraception as relevant. Such adolescents may make it a priority to attend to and integrate such information so that they are able to use it when confronted with a sexual situation. The additional finding that more cognitively advanced adolescents were more likely to report having used contraception further supports this argument. In other words, not only do adolescents with higher levels of cognitive development have more knowledge about sexuality and contraception, but these adolescents may also be more apt to put such knowledge into practice. (It is important to note, however, that the ability to generate alternatives and reason about probability [i.e., cognitive development] was assessed via logic "story" problems that did not involve sexual situations. Thus, these more general conclusions regarding the sexuality-based cognitive factors that underlie adolescent sexual behavior may be regarded as speculative.)

Interestingly, cognitive development was not related to attitudes about contraception. Instead, self-esteem was predictive of such attitudes for the full sample, as well as for the gender-specific samples. Self-esteem was also related to two of the four knowledge scales and the tendency to use contraception. Given that those with high self-esteem presumably seek to maintain their sense of self-worth, it is not surprising that such individuals would be concerned about the consequences of their sexual behaviors. In addition, it has been demonstrated that there is a strong relationship between level of self-esteem and scores on measures of personal agency (Whitley, 1983). Thus, individuals with high self-esteem may be concerned about maintaining control over events in their life. Issues of sexuality and contraception are probably not perceived as trivial by adolescents with high self-esteem, and these individuals may be more likely to expend the effort necessary to gather information about contraception, have more positive views of such preventive measures, and use contraceptives when they find it necessary.

It has been suggested that adolescents who are more egocentric (in terms of having increased levels of imaginary audience ideation) are less likely to acknowledge their sexual interests to the imaginary audience and to themselves (Cvetkovich *et al.*, 1975). Findings of this study support this notion. That is, it appears that adolescents who have higher imaginary audience scores are less likely to report using contraceptives. Interestingly, personal fable ideation was not predictive of contraceptive knowledge,

attitudes, or behaviors in *any* of the analyses. The relatively low internal consistency coefficient for this scale may explain this lack of findings; more work may need to be done on the NPFS scale before it is included in future research protocols.

In addition to running the analyses for the full sample, gender-specific data analyses were also conducted. Although males demonstrated higher levels of cognitive development and self-esteem, females were more knowledgeable about sexuality and contraception, and they had more positive attitudes about contraception. The nature of these gender differences was somewhat surprising in light of other results in this study suggesting that self-esteem and cognitive development are positively associated with knowledge and attitudes about contraception. Specifically, we expected to find (given the results for the full sample) that those who had higher levels of the former would also have higher levels of the latter. Instead, we found significant gender differences suggesting that females are more concerned about obtaining and recalling information about contraception than are males, despite the fact that females had lower levels of cognitive development and self-esteem.

The finding that females had greater knowledge about contraceptive methods and effectiveness may be due in part to the nature of the measures used; the items of the contraceptive knowledge and effectiveness scales deal primarily with female-controlled methods of contraception. The higher cognitive development scores for males appears to be due to superior performance on this measure by the older males. That is, in an additional analysis where males and females were compared on the cognitive scale for each of the three age groups separately, a gender difference (in the direction of males scoring higher) only emerged for the oldest group. This finding is similar to that reported by Gray and his colleagues (Gray and Hudson, 1984; Gray and Rush, 1986). In a study of cognitive development among young adolescents, Gray and Hudson (1984) found no gender differences. On the other hand, when examining older adolescents and adults (>17 years old), males scored higher than females (Gray and Rush, 1986). This age-related gender difference may have occurred because of the mathematical and logic orientation of the items that make up the HIYL cognitive development scale. As suggested by Huston and Alvarez (1990), males are more likely to view math, computers, and science more favorably than do girls during adolescence. Thus, the observed gender difference in the current study may have been due to the cumulative effects of gender differences in school coursework selection during the adolescent period.

Additionally, there was a tendency for self-esteem to be predictive of contraceptive use for females but predictive of sexual activity for males. That is, females with high self-worth were more likely to be concerned

about the consequences of their sexual behaviors than were their low self-esteem counterparts. On the other hand, males who had high levels of self-worth tended to be more confident in initiating sexual intercourse than were males who had low self-esteem. Interestingly, these results are consistent with gender stereotypes.

The findings of this study have implications for the manner in which sex education classes are conducted. First, it appears that contraceptive behaviors and knowledge about contraception vary as a function of the cognitive-developmental level of the adolescent. This finding supports speculations by a number of authors who maintain that the failure of many sex education programs to prevent contraceptive nonuse may be due to a lack of fit between educational programming and the developmental level of the students (Baizerman, 1977; Cvetkovich *et al.*, 1975; Gordon, 1990; Hamburg, 1986; Jorgensen, 1981; Sachs, 1985). Moreover, Gordon (1990; also see Brooks-Gunn and Furstenberg, 1989, and Goldman and Goldman, 1982) suggests that cognitive development is domain-specific and that development in the sexuality domain is likely to lag behind development in other domains due to a lack of open discussions about sexual issues in this culture.

Second, given that males are more likely than females to report having had intercourse, the lower levels of contraceptive knowledge and the less positive attitudes toward contraception on the part of males are particularly worrisome. It appears that sex educators are not reaching the males in their classes to the same degree that they are impacting on the females. Thus, programming may not only need to be geared toward the developmental level of the students, but may also need to be tailored to the gender of the students as well (Crossman *et al.*, 1992; Goldfarb-Maskin, 1991). Unfortunately, at present, we know very little about adolescent male sexual and contraceptive behaviors (Bolton and MacEachron, 1988).

Some limitations of this study compromise our ability to draw definitive conclusions concerning the processes discussed. First, data were obtained from a single source with a single methodology; the magnitude of the observed effects may have been enhanced by such a data collection strategy. On the other hand, because results differed across the predictor and demographic variables, interpretations based solely on common method variance explanations are not adequate to account for the full range of findings. Second, as is the case in most sexuality research (Catania *et al.*, 1990), participation bias may limit the generalizability of the present findings (i.e., self-selection biases and the need for parental consent may have biased the nature of our final sample). Third, studies of contraceptive behaviors should include more detailed assessments of these behaviors, such as information on time since initiating sexual activity, information on sexual behaviors other

than vaginal intercourse (e.g., the frequency of sexual behaviors involving same-sex partners), and the frequency and effectiveness of contraceptive use. As stated earlier, however, school policies sometimes prevent investigators from including such questions in their research protocols. Fourth, the causal direction of the relationships that were reported here cannot be specified due to the cross-sectional nature of the design. We do not know, for example, if a less advanced cognitive-developmental level *causes* an adolescent to retain less information about contraception. We also do not know if sexually-active adolescents see contraceptive knowledge as more relevant and, as a consequence, seek such information. Longitudinal investigations in this literature have been rare but will be necessary if we are to identify factors that are causally related to contraceptive knowledge, attitudes, and behavior. Finally, little attention has been paid to the degree to which sex education programs have an impact on how adolescents think about contraception and sexuality. To do so, cognitive-developmental measures that focus specifically on the sexuality domain will need to be developed.

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