Masculinity-Femininity Guides Sexual Union Formation in Adolescents

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The authors test the idea that patterns of masculinity-femininity (MF) help sort adolescents into romantic couples. Using a nationally representative sample of adolescents in Grades 7 to 12 from a probability sample of secondary schools in the United States, an MF measure was constructed by selecting a set of questionnaire items demonstrating sex differences. For each respondent, the probability of being a boy was predicted. Respondents identified opposite-sex romantic partners within their school. When the partner identified also was interviewed, the authors were able to create MF for both members of the couple. Trichotomizing MF scores for each sex, it was determined that couples with a very masculine boy and very feminine girl are most likely to have sex, and to have sex the soonest. The couples for which both members are in the average MF range for their sex are the quickest to break up. The pattern of MF is a strong influence on the behavior of adolescent romantic couples.

Keywords: *masculinity-femininity; adolescent; couples; sexual intercourse; romantic*

Biological sex is the fundamental structural element in reproduction in advanced animals, including humans, and therefore plays a central role in both biological and social demography. In the process of fetal sexual development, sex differences in later behaviors of offspring are biologically influenced (Panksepp, 1998; Udry, 2000) and become a foundation, along with age, of human social structure in all societies. We presume that the sexual attraction of men and women is therefore imbedded in the behavioral differences between the sexes. Men are sexually attracted to women and women to men by the systematic differences in their masculinity-femininity (MF).

The same hormonal processes that influence sex differences in behavior also create within-sex differences along the same behavioral dimensions. We therefore identify some men as more masculine than others, that is, having more of the behavior characteristics that distinguish men. Likewise, we distinguish some women as more masculine, or less feminine, than other women, that is, having fewer of the behavioral attributes that distinguish women and more that characterize men. For heterosexuals, sex differences, both physical and behavioral, may be thought of collectively as erotic stimuli that form the basis of within-sex discriminations made by the members of the opposite sex. In this article, we argue that the probability of a particular man mating sexually with a particular woman is a function of the direction and degree of differences in their MF.

Our theory is similar to that proposed by Daryl Bem (1996) called "exotic is erotic." According to Bem's theory, simplified here, individuals feel erotic attraction to

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individuals whose behavior is different from their own. Those with sex-typical behavior will perceive the opposite sex as exotic, therefore provoking emotional response that is experienced as erotic. Those with sex-atypical behavior may perceive the same sex as exotic.

Bem's theory is meant to be a general explanation for why men and women are attracted to one another and a specific explanation of why some persons of each sex are attracted to members of the same sex. It tells us little in itself about what men will be attracted to what women. Extrapolating from Bem's logic, we argue that the more masculine man and the more feminine woman will be attracted to one another more than the man and woman who are each in the middle range for their sex. But the logic of Bem's theory also allows the inference that the very masculine woman and the very feminine man will be erotically attracted to one another more than other less extreme combinations.

The logic of our arguments implies that the degree of sex typing of individuals and the direction of sex typing will influence who is attractive to them and whom they attract. But each chooser is making selections of masculinity-femininity within the opposite sex and not making a direct comparison to himself. Therefore, the pairing of most masculine boys with most feminine girls will be most erotically attracted to one another and most likely to have sex. Pairs in which both members are in the middle range of MF for their sex will experience lowest sexual attraction to one another and be least likely to have sex, compared to all other combinations.

This theory has congruence with the biological theory of sex dimorphism in primates specifically and in mammals generally. This theory postulates that prenatal testosterone, acting on the fetus during a critical period (in the second trimester for humans), masculinizes the body through transformation to dihydrotestosterone and masculinizes the brain through transformation to estrogen after entering the brain. The process works the same way for women as it does for men. The male fetus produces enormous amounts of testosterone as its gonads mature and at the crucial period permanently masculinizes the brain. The gonads of the woman do not produce testosterone prenatally and so the female brain is hardly masculinized at all. Variations in masculinization prenatally in women is accounted for by the small amount of testosterone created by the mother (Panksepp, 1998; Udry, 2000, 2001). In adolescence, endogenous testosterone activates the brain structures laid down in the prenatal period and reinforces the predisposition toward masculine behavior. This biological process is a theoretical foundation for treating masculine-feminine behavior as a bipolar, unidimensional concept. In no way does this theory undermine the principle that socialization influences masculinity and femininity as a cultural entity; in fact, the two processes interact (Udry, 2000). Because the hormonal processes involved are genetically influenced, MF of behavior also should be partially genetically influenced.

Sociological theories of mate selection have mostly dealt with the comparative social attributes and attitudes of spouses and find similarity in attributes as compared with random selection models. Social psychological theories of mate selection have mostly dealt with comparative personality attributes and have found slight to moderate similarity (Murstein, 1980; Smith, Byrne, & Fielding, 1995). Complementary needs theory (e.g., he likes to be dominated, she likes to dominate) was formulated by Winch (1958), tested but seldom supported (Winch, 1958) over the decades, and continued to attract attention (Antill, 1983). No one has empirically confirmed and replicated any mating theory based on inverse correlations of traits.

Unfortunately for our comparisons with previous literature, the recent research that has been done on romantic heterosexual couples concerning masculinity and femininity uses the Bem Sex Role Inventory (BSRI) (S. L. Bem, 1977) or Personal Attributes Questionnaire (PAQ) (Spence, Helmreich, & Stapp, 1974). In these scales, masculinity and femininity are conceptually orthogonal and deliberately avoid the possibility of being treated as measuring differences between men and women. Orthogonal scales of masculinity and femininity have dominated research in this area for the past 30 years. They cannot be used for measuring bipolar MF because in most populations, for both sexes, masculinity and femininity have correlations near zero for the BSRI and PAQ. Using the standard BSRI classification system of scoring individuals (masculine, feminine, androgenous, and undifferentiated), Antill (1983) and Kurdek and Schmitt (1986) found married couples to be randomly paired.

Using the PAQ, Lamke, Sollie, Durbin, and Fitzpatrick (1994) found masculinity scores to be uncorrelated within pairs of dating partners in college. Likewise, femininity scores are uncorrelated. Kurdek and Schmitt (1986) found a nonrandom match in heterosexual cohabitors, but no specific pattern was hypothesized and tested for significant departure from chance. Because the PAQ and BSRI are used in these studies, they are not useful in anticipating our findings.

Smith et al. (1995) approach the problem of how couples are matched from a perspective that is tangentially related to our approach. They start from the broad finding that individuals are attracted to similar others. They paradoxically define members of a heterosexual couple as similar if each has an extreme version of the sex role for their sex. They therefore hypothesize that couples will form around this similarity (the man has hypermasculine

attitudes toward the male sex role and the woman has hyperfeminine attitudes toward the female sex role). In a sample of actual dating college couples, hypermasculinity of men and hyperfemininity of women had a moderately high correlation ($r = .53$). What this means in terms of their hypothesis is not as clear as it seems. Women who are low on hyperfemininity are not high on hypermasculinity, and they are not low in femininity; in addition, men who are low on hypermasculinity are not high on hyperfemininity, and they are not low in masculinity. The low point on the hypermasculinity scale is nonhypermasculinity. Neither scale measures the extent to which the behavior of a respondent is typical of his or her sex.

The correlation coefficient presumably means that low-hypermasculinity men and low-hyperfemininity women also select one another, even though their similarity consists of low scores on two different qualities. Hamburger, Hogben, McGowan, and Dawson (1996) have since constructed a scale of "hypergender ideology" that can be administered to either sex and combines into a single scale item that covers both extreme male and extreme female stereotypes. Nevertheless, the scale is still tied to what are taken to be extreme gender role attitudes.

The guiding idea in Smith et al. (1995) with hyperfeminiity attracted to hypermasculinity is similar in its structure to Winch's (1958) type of complementarity and similar to ours: Individuals form heterosexual couples on the basis of the contrast in gendered behavior in the traditional direction.

Much of the literature on gender-related aspects of romantic/sexual unions is focused on the relationship between gender attributes of the couple and the emotional quality, satisfaction, or adjustment of the partners (Aube & Koestner, 1995; Aube, Norcliffe, Craig, & Koestner, 1995; Bradbury, Campbell, & Fincham, 1995; Bradbury & Fincham, 1988; Lamke et al., 1994; Langis, Sabourin, Lussier, & Mathieu, 1994; McCann, Stewin, & Short, 1990; Siavelis & Lamke, 1992; among others). These articles all use the orthogonal scales of the BSRI or PAQ and therefore are not measuring MF in a way that is relevant to our theory.

HYPOTHESES

We tested the following hypotheses:

Hypothesis 1: Boys and girls both of whom are in the middle range of masculinity-femininity for their sex do not identify one another as partners.

Hypothesis 2: Couples consisting of a masculine boy and a feminine girl are most likely to have sex, and couples consisting of a boy and a girl both in the middle range of masculinity-femininity for their sex are the least likely.

Hypothesis 3: Couples consisting of a masculine boy and a feminine girl are the quickest to have sex, and couples consisting of a boy and a girl both in the middle range of masculinity-femininity for their sex are the slowest.

Hypothesis 4: Couples consisting of a boy and a girl both in the middle range of masculinity-femininity for their sex have relationships of the shortest duration.

METHOD

Our research design incorporates features that distinguish it from most previous studies. First, we use a bipolar measure of gendered behavior that is quite different from the prevailing scales and is based on sex-dimorphic behaviors of our respondents. Second, we study adolescents. Third, we use a new method of identifying couples that nets more or less representative national samples of couples rather than convenience samples used in all previous studies. Fourth, our method of identifying couples allows fresh definitions of attraction and mating. Fifth, we have masculinity-femininity scores on the pool of individuals from whom pairs were identified, not just the selected pairs.

We have hypotheses that specify unique comparisons not tested before: Do couples with particular joint patterns of gendered behavior actually select one another? Do they have intercourse (or have intercourse more quickly) than couples with other patterns? and Do they have relationships of longer duration?

We proposed to test our theory on adolescent romantic relationships that form among students in secondary schools. The method we used allows us to identify a substantial set of romantic relationships as we interview a moderate proportion of students in each school of each sex, creating a situation in which both members of a pair are independently interviewed in the absence of our prior information about a relationship between them. We also identified same-sex romantic relationships, but the number of cases is too small to permit the analysis required. We are interested in pair formation, not simply individual attraction. Some people are attracted to others who are not attracted to them; therefore, we identify a pair by a nomination of a boy by a girl or nomination of a girl by a boy. We identify a pair as reciprocal if each also nominates the other.

The Add Health Study

The analyses in this article are based on the National Longitudinal Study of Adolescent Health, hereafter Add Health. Add Health is a school-based study of a nationally representative sample of adolescents in Grades 7 to 12 in the school year 1994-1995. From a list of all high schools in the United States with a Grade 11, a stratified probability sample of 80 high schools was selected. For

districts in which the high school did not span the Grades 7 to 12, a feeder school was selected with probability of selection proportional to the contribution of the feeder school to the high school in order to complete the grade span, for a total of 132 discrete schools. A school that refused to participate was replaced by a school from the same sampling stratum. In all, 79% of schools initially contacted agreed to participate. In each school an op-scan, one-period questionnaire was self-administered in the classrooms to all students present on a particular day. From a combination of those taking the school questionnaire and the school roster, a nationally representative sample was drawn for home interviews. Using information from the school questionnaires, several ethnic oversamples and a genetically informative sample of sibling pairs were drawn in addition to the main sample.

Home interviews were completed in 1995 (Wave I) using a laptop computer administration with audio-assisted self-administration for sensitive questions. For the audio-assisted section, respondents read the screen, listened to recorded questions through earphones, and entered their own responses into the computer without interviewer participation. A total of 20,745 home interviews were completed, for a completion rate of 79%.

In 1996, a second home interview (Wave II) was executed, attempting to reinterview all who were in the Wave I interview except those who were in Grade 12 during the 1994-1995 school year. Completion rate was 88%. Questions added in the Wave II interview allowed us to cover more domains of behavior in the development of our masculinity-femininity measure. Hence, the Wave II partnership data were used in this analysis, and all other variables in the analysis also come from Wave II.

In each school, an average of more than 200 respondents was interviewed. Overall, the average proportion interviewed of those enrolled was about 1 in 5. Each respondent was requested to identify partners in up to three romantic relationships in the past 18-month time window. Next, they were asked to identify any other partners with whom they had sex in the same time period; therefore, a maximum of six partners could be identified. If the partner was in the same or feeder school, the partner was identified by the respondent calling up in the computer a roster of all eligible students by grade and sex and highlighting the name of the romantic or sex partner. More than 4,000 respondents nominated no one. Most respondents nominated one, two, or three opposite sex respondents. Of the 15,688 reported relationships from Wave II eligible adolescents, there were 983 adolescents from Wave II who nominated 1,067 opposite-sex partners who also were interviewed at Wave II. This allowed the linking of questionnaire responses of nominator and nominee. Given that the nominee was interviewed, it could then be determined upon study completion whether the nominee reciprocated the nomination. Although there were 1,067 nominated relationships, there are only 865 unique couples. This is because the 202 boys with their reciprocating partners make up the same couples as the 202 girls with their reciprocating partners. A nonreciprocated nomination indicated that the nominee did not classify whatever relationship he had with the nominator as a romantic relationship or chose not to identify the relationship. The respondents knew we could match their questionnaires with those of people they nominated, but unless the nominator told the nominee, the nominee had no way of knowing that he was nominated or by whom. Respondents identified from a list of 16 partnered behaviors those that had occurred during the relationship, including sexual intercourse, and the order in which the behaviors occurred in that relationship.

Because our analysis investigates the behavior of the couple rather than the adolescent, we constructed an appropriate sampling weight for each couple using the sampling weights for the schools and adolescents available with the Add Health data. This sampling weight was computed as the inverse of the joint selection probability of the pair of adolescents forming a couple. This can produce some couples whose computed weights will be extremely large, thereby increasing the variability of the weights and any estimates computed from them. To minimize the variance and bias of estimates, a trimming procedure was used to limit the value of extreme weights (see the Add Health Web site for details; Chantala, 2001).

Constructing a Measure of Masculinity-Femininity

Our measurement of masculinity-femininity (MF) is based on the traditional techniques of designing scales of MF of Terman and Miles (1936) and is described in more technical detail in Cleveland, Udry, and Chantala (2001). It specifically measures the probability of being a boy. Items of behavior and attitude were selected on the basis of sex differences in response from the questionnaire, covering a wide range of domains. From 50 items showing moderate sex differences and only moderate intercorrelations, a logistic regression was constructed predicting the probability of being a boy. Items were selected by a stepwise procedure to objectively screen the predicting variables. A scale of 16 items was selected. This is an adaptation of a technique introduced by Lippa and Connelly (1990). The norms were derived from the sample for which the empirical analysis is planned. Such a measure can be retrofitted to most surveys in which there are men and women of the same general age and social composition. Thus, the scale is tailored to the behavior of the sample, not tied to some previous time

period, a different age group, or a group of different social composition. Such a scale can be designed for a sample of children, the aged, or a different country or language group. In our sample, each sex contained respondents who scored all along the spectrum from .01 to .99. A girl or boy with an MF of .01 has a pattern of responses that predicts a probability of being a boy of only .01.

Table 1 displays the questionnaire items for the MF scale. For each item, we provide the coefficient for the regression equation that predicts the probability of being a boy. The most influential item is frequency of crying. The mean sex difference in these items is less than half a male standard deviation, and the range is .06 to 0.47 (except for frequency of crying, 1.21). The receiver operating characteristic (ROC) is .82, meaning it correctly predicts the sex of a random respondent 82% of the time. This can be compared to correct diagnosis from mammography, which has a ROC of 80% to 90% (Cleveland et al., 2001). On average, deletion of one variable reduced the percentage correctly classified by 1%. The items are widely scattered in the Add Health questionnaire, but even when the items are displayed together, it is not obvious to the respondent what the scale measures.

Lippa and his colleagues have found low correlations between their measures of gender diagnosticity (GD) (constructed on the same principles as the present MF scale) and the common orthogonal measures of masculinity and femininity (BSRI and PAQ). Their articles demonstrate the general utility of GD-type measures by showing interesting relationships between GD and sexual orientation, vocational interests, and extraversion, even mortality, and demonstrating its heritability by behavior genetic analysis (Lippa, 2000; Lippa & Arad, 1997; Lippa & Hershberger, 1999; Lippa, Martin, & Friedman, 2000). Cleveland et al. (2001) have demonstrated the heritability of MF for each sex using the genetically informative subsamples of Add Health. We have also shown using MF in Add Health that boys with only same-sex romantic partners are much more feminine than boys with opposite-sex partners (Udry & Chantala, 2002).

In the analyses presented below, MF is divided into thirds within each sex. The lowest third is called feminine, or F. The middle third is called Average, or A. The highest third is called masculine, or M. Couples were classified by the combination of boy and girl MF. If the girl was F and the boy was M, the couple was designated FGirl/MBoy. If each was in the middle third for his or her sex, the couple was designated AGirl/ABoy. We also used MF as a linear variable in all comparisons. Figure 1 gives the MF distribution of the Add Health sample at Wave II for each sex. The mean MF for girls is .33 (SD = .24). The mean for boys is .63 (SD = .22). The distributions are a different shape by sex. The girls' distribution shows the highest frequency at the most extreme feminine values, gradually declining but with cases present into the most extreme masculine values. The boys' distribution by comparison has few cases in the most masculine values, increasing to its peak frequency in the range of .69 to .80 and gradually declining toward the most feminine values. Each sex distribution of MF includes the entire range of possible scores.

Adolescents affected by the attrition imposed by the analysis criteria do show some differences in the MF distribution. There are two levels of attrition: (a) nominated no one and not nominated by anyone and (b) nominated someone but no nominee was interviewed. The analysis group includes those who nominated or were nominated by someone who was also interviewed at Wave II. For both boys and girls, there was no difference in mean MF for attrition group (b) and the analysis group. Girls who nominated no one were significantly more masculine than those in the analysis group, whereas boys who nominated no one were more feminine than boys in the analysis group.

For each step in union formation, we first test the hypothesis that formation is dependent on the joint MF tercile of the couple, with AGirl/ABoy as the reference group. This means that respondents form unions that jointly depend on the MF of the two individuals and that for a given individual, whether a union is formed with a particular other individual depends not only on his MF but the MF of the other particular individual. This is the simple interaction hypothesis. If there is an interaction, we next test the hypothesis that AGirl/ABoy couples are least likely to form a union and that the FGirl/MBoy couple is most likely to form a union. If there is no interaction, we test for a main effect, first with trichotomized MF and then with a linear MF. If there is only a main effect, union formation is only the propensity of the individual MF, irrespective of the MF of a particular partner.

We propose the interaction hypotheses that the AGirl/ABoy couple is least likely because we assume that they have the least perceived contrast of MF and that other combinations have more perceived contrast. We propose the interaction hypothesis that FGirl/MBoy couples are most likely for two reasons. First, they have the most perceived contrast in MF. Second, we tested an age-at-first-sex hazard model for the whole sample main effect using a trichotomous MF as a predictor. We found that FGirls had sex younger than AGirls and MGirls and that MBoys had sex younger than ABoys and FBoys when partner status was ignored. We assumed that the combination of an MBoy and FGirl would have the highest likelihood of union formation when particular combinations were examined.

TABLE 1: Questionnaire Items for the MF Scale

Content of Items	*Regression Coefficient*	*Direction of Response Pattern*	*(Boy-Girl Mean)/ (Boys' SD)*	*Boys' SD*
Frequency of crying	–1.2525	0 to 4; 4 = every day	–1.21	0.43
Frequency of moodiness	–0.2255	0 to 4; 4 = every day	–0.47	0.87
Frequency of poor appetite	–0.2022	0 to 4; 4 = every day	–0.38	0.74
How honestly answered questions	–0.2425	1 to 4; 4 = completely honest	–0.21	0.86
Trouble paying attention	0.3109	0 to 4; 4 = every day	0.11	1.06
Bothered by things	–0.1194	0 to 3; 3 = most/all of the time	–0.34	0.63
How physically fit	–0.3676	1 to 5; 5 = strongly disagree	–0.48	0.82
Past 12 months, frequency serious fighting	0.6654	0 to 3; 3 = 5 or more times	0.27	0.60
Frequency of exercising	–0.1331	0 to 3; 3 = 5 or more times	–0.06	1.06
Frequency roller blading/cycling	0.3056	0 to 3; 3 = 5 or more times	0.29	0.99
How emotional you are	0.1217	1 to 5; 5 = strongly disagree	0.44	0.98
Do you like yourself as you are	–0.2042	1 to 5; 5 = strongly disagree	–0.44	0.79
Live without thought for future	–0.2171	1 to 5; 5 = strongly disagree	–0.26	1.11
How sensitive to others feelings	0.3175	1 to 5; 5 = strongly disagree	0.32	0.80
Do you like to take risks	–0.1762	1 to 5; 5 = strongly disagree	–0.31	1.01
Upset by difficult problems	0.2025	1 to 5; 5 = strongly disagree	0.36	1.06

NOTE: MF = masculinity-femininity.

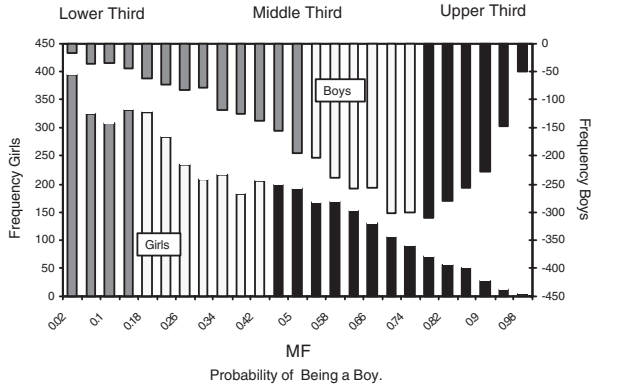

Figure 1 MF distribution.
NOTE: MF = masculinity-femininity.

Couple behaviors we used to investigate our hypothesis include partner reciprocation, having vaginal intercourse in the relationship, time to first sex with partner, and length of relationship. Because not all needed questions were answered by at least one adolescent in the couple, some couples were omitted from each of the analyses. Table 2 shows the distribution of the joint MF for the eligible 865 couples and the subset of these couples that was actually used for each analysis.[1]

Data Analysis

Because our data come from a complex sampling design, we used Stata Statistical Software (Stata Corp., 2001) to correct for clustering and unequal probability of selection of couples.[2]

Initially, we conducted simple tests of independence to investigate the association of MF category of the boy and girl with reciprocating partner status and occurrence of vaginal intercourse in the relationship. Both of these outcomes showed statistical significance. We next fit logistic regression models to predict partner reciprocation and whether sexual intercourse had ever occurred with the partner.[3] Cox regression models were fit to predict duration of relationship and time until first intercourse in a relationship. Chi-square statistics also were used to test proportionality assumption for the Cox regression models. All models fit the proportionality assumption.

In testing our hypotheses, we used the trichotomized MF as the form of the independent variable first. If the hypothesis was not confirmed, we tested it with a linear MF. We used the categorized MF model first because our hypotheses are all nonlinear. Because we know that researchers generally prefer linear models because the models are more parsimonious and efficient, we tested them to make certain we were not missing unnoticed linearity. No models with linear MF had significant MF terms except when predicting reciprocity.

RESULTS

Partner Reciprocation

Couples were eligible for the partner reciprocation analysis if both members were listed on the roster used by each respondent to identify a partner. This set contains 202 girls and boys listing each other as a partner, 300 girls listing a nonreciprocating boy as a partner, and 363 boys listing a nonreciprocating girl as a partner, as shown in Table 2, column 3. This resulted in 202 recipro-

TABLE 2: Percentage of Couples in Each Combination of MF Category and the Subset for Whom Data Were Available for Each Analysis

Girls' MF Category	*Boys' MF Category*	*All Couples* (n = *865*)	*Partner Reciprocates Analysis* (n = *859*)	*Vaginal Sex With Partner Analysis* (n = *653*)	*Time to First Sex With Partner Analysis* (n = *484*)	*Duration of Relationship Analysis* (n = *580*)
F	F	14.83	14.98	14.81	17.35	16.88
F	A	10.02	9.93	10.56	10.75	10.82
F	M	12.36	12.49	11.77	11.54	12.06
A	F	9.71	9.80	10.04	9.88	9.92
A	A	10.77	10.35	10.33	10.37	10.46
A	M	12.35	12.41	12.43	11.41	10.24
M	F	8.43	8.51	8.06	8.06	8.01
M	A	11.27	11.19	10.43	10.97	12.69
M	M	10.26	10.36	11.57	9.67	8.93
Total		100	100	100	100	100

NOTE: MF = masculinity-femininity; F = feminine; A = average; M = masculine.

cating couples and 663 nonreciprocating couples. Six of the 865 couples in our data set were excluded from the analysis because one member was omitted from this roster, resulting in 859 couples available for analysis. The MF distribution of these couples is shown in Table 2, column 4.

Is there a relationship between MF and reciprocation? Our first hypothesis is that the AGirl/ABoy couples reciprocate least. We used a logistic regression with trichotomized MF scores, age of girl, and the interaction between the MF category for the boy and girl. The trichotomized MF variables each had three levels (F, A, and M) and were represented by three indicator variables for the main effect of girls' MF and three for the main effect of boys' MF. The average categories for both girls and boys were omitted from the model and became the reference group. An interaction term between the main effect of girl's MF and the main effect of boy's MF was created and is represented by four variables. No term except age was significant, with or without the interaction. We reject the hypothesis that AGirl/ABoy couples are least likely to reciprocate.

Because the categorized MF analysis failed to predict reciprocation, we next tested whether there is a linear relationship between MF and reciprocation in our couples. For our 859 couples, we constructed a logistic regression model predicting reciprocation from age of girl, boy's MF, girl's MF, and an MF interaction. All linear terms were significant at the .05 level. The MF interaction was not significant and was omitted from the final model (Table 3).[4] MF for each sex is inversely related to reciprocation, with nearly identical coefficients. We evaluate the equation for couples including a girl at age 16. The MBoy/MGirl couples have a reciprocation probability of .10, whereas FGirl/FBoy couples have a reciprocation probability of .40, with MGirl/FBoy and FGirl/MBoy couples having a reciprocation probability of .22. Because the interaction term was not significant, we conclude that reciprocation is determined by the main effects of MF of the boy and the girl and is not sensitive to the particular combination of MF. But the consequence of this is still that MGirl/MBoy couples are only one fourth as likely to reciprocate as FGirl/FBoy couples. We infer that those with masculine scores (whether boys or girls) must have higher thresholds for recognizing (or experiencing) the significance of a relationship. This is consistent with the adage that men are insensitive to the nuances of emotional relationships.

Had Vaginal Sex With Partner[5]

Our second hypothesis is that the AGirl/ABoy couples are least likely to have sex and the FGirl/MBoy couples are the most likely. Information on the occurrence of vaginal sex in the relationship was not available on 47 couples, whereas conflicting information was reported by 21 couples. Prior sex was missing for 144 couples. Of the remaining 653 couples used in the analysis, 152 couples both reported the same sexual activity, 257 couples had information available from only the boy, and 244 couples had information available from only the girl. The MF distribution of these couples is shown in Table 2, column 5.[6]

We used a logistic regression model including age of girl, trichotomized MF scores, and the interaction between the MF category for the boy and girl to predict if the couple reported vaginal sex in their relationship. The trichotomized MF variables each had three levels and were represented by three indicator variables (FGirl, AGirl, MGirl) for the main effect of girl's MF and three for the main effect of boy's MF (Table 4). The A cat-

TABLE 3: Final Logistic Regression Model for Linear MF Predicting Partner Reciprocation

Variable	β (SE)	p *Value*
Age of girl	0.17 (0.07)	.014
Girls' MF	–0.87 (0.34)	.010
Boys' MF	–0.87 (0.44)	.047
Intercept	–3.19 (1.06)	.003

NOTE: n = 859 couples. MF = masculinity-femininity.

TABLE 4: Final Logistic Regression Model for Predicting Couple Has Had Sex

Variable	β (SE)	p *Value*
Age of girl	0.48 (0.08)	< .001
Girls' MF		N/A[a]
F	0.74 (0.54)	
A	*reference*	
M	0.91 (0.52)	
Boys' MF		N/A[a]
F	0.98 (0.50)	
A	*reference*	
M	–0.56 (0.76)	
Interaction		
Girls' MF × Boys' MF		.01
FGirl/FBoy	–0.91 (0.62)	
FGirl/MBoy	–1.14 (0.65)	
MGirl/FBoy	1.03 (0.87)	
MGirl/MBoy	0.40 (0.79)	
Girl had previous sex partner	0.57 (0.18)	.001
Boy had previous sex partner	0.46 (0.26)	.07
Intercept	–10.46 (1.55)	< .001

NOTE: MF = masculinity-femininity; F = feminine; A = average; M = masculine. The A categories for both girls and boys were omitted from the model and became the reference group. The trichotomized MF variables each had three levels and are represented by three indicator variables (e.g., FGirl, AGirl, MGirl) for the main effect of girls' MF and three for the main effect of boys' MF.

a. Because MF of the boy and girl are predictive as an interaction, no test of significance is done on the main effects for boys' MF or girls' MF.

egories for both girls and boys were omitted from the model and became the reference group.

To test Hypothesis 2, we considered that a previous study (Peplau, Rubin, & Hill, 1977) had demonstrated that the likelihood of a college dating couple having sex with one another was a strong function of the previous sexual histories of the two individuals. Couples in which neither had previous sex had a low probability of having sex with one another, whereas couples in which both had previous sex partners were nearly 10 times as likely to have sex with one another as the couple in which neither had previous sex partners. We therefore included terms in our analysis representing whether each partner had previous sex partners before the relationship in the analysis.

An interaction term between the main effect of girl's MF and the main effect of boy's MF was created and is represented by four variables. This interaction model was the best model for predicting if the couple has had sex (Table 4). Because the interaction term is represented by four components, all four were tested simultaneously to verify that the interaction term should be included in the model. The interaction was significant.[7] AGirl/ABoy couples have a lower probability of having sex than all other groups except for the AGirl/MBoy couples. However a one-sided test at the $p < .05$ level shows only the FGirl/ABoy and MGirl/ABoy couples have a statistically greater probability of having sex. Hence, our hypothesis that the AGirl/ABoy couples are least likely to have sex is not supported by the data.

The probability of having sex is highest for a couple including an FGirl and an MBoy. Table 5, based on a recomputation of the equation in Table 4, shows the risk ratio for having sex for all couples compared to the FGirl/MBoy couple. All couple categories have lower risk than the FGirl/MBoy. The FGirl/MBoy is 3 times as likely to have sex as the AGirl/ABoy couple.

Time to First Sex With Partner

We indicated earlier that in an exploratory model of the relationship between individual MF and age at first sex, using the entire Wave II sample, the most feminine girls had sex at a younger age and the most masculine boys had sex at a younger age. We interpret the analysis as an individual measure of initial propensity for sex not considering partner status. We used this as a framework for main effects in our partnered sample. We hypothesized that a couple with an MBoy and an FGirl would have first sex earliest, simply by virtue of an additive model of the effects of the two MF values. If the MBoy/FGirl couple is more likely to have sex than the others beyond the effect of their individual propensities, then an interaction term should be significant.

Of the 865 couples available for analysis, 381 were omitted from the time to first sex analysis because of incomplete information.[8] A total of 484 couples remained in our analysis (Table 2, column 6).

In an honesty analysis of a previous study of adolescent sexual behavior, Newcomer and Udry (1988) found that girls gave more reliable and (self-reported) more honest reports of sexual behavior than did boys. In the present analysis, because we are using hazard models, it is necessary to have a report on the month in which the relationship began and the month in which the couple first had intercourse. Couples did not always agree on the month in which the relationship began or the month in which sexual intercourse first occurred. We therefore elected to use girls' reports for all events if available, otherwise boys' reports. This means that we can be more

TABLE 5: Risk Ratio (RR) for Having Vaginal Sex With Partner Compared to the FGirl/MBoy Couple Controlled for Previous Sexual Experience

	FBoy RR (p *value)*	*ABoy RR* (p *value)*	*MBoy RR* (p *value)*
FGirl	.71 (.20)	.67 (.15)	*reference*
AGirl	.83 (.25)	.34 (.003)	.20 (.003)
MGirl	.68 (.11)	.78 (.25)	.68 (.16)

NOTE: MF = masculinity-femininity; F = feminine; A = average; M = masculine; reference = reference group. The trichotomized MF variables each had three levels and are represented by three indicator variables (e.g., FGirl, AGirl, MGirl) for the main effect of girls' MF and three for the main effect of boys' MF. The *p* value in parentheses is for a one-sided test. These scores were evaluated at girls' age 16.

confident of the data. We included a covariate in our models to indicate if the report of time to first sex was reported by the boy rather than the girl to adjust for differences in partner reports. (We also compared results from a model using only boy's reports to a model using only girl's reports and found the overall pattern and conclusions to be the same as using the data combined in the manner just described.)

To test the hypothesis that AGirl/ABoy couples are slower to have sex with each other than those of other MF combinations, we constructed a hazards model that contained terms for the age of girl, prior sex experience of girl and boy, a dummy term indicating whether boy's or girl's report is used, trichotomized MF scores, and the interaction between the MF category for the boy and girl. This model is displayed in Table 6. The interaction term is significant, confirming true couple MF effects.

Tables 7 and 8 are derived from recomputation of the equation in Table 6. Table 7 shows that except for the AGirl/MBoy, the hazard rate for all other couples starting to have sex is greater than the ABoy/AGirl couple at the $p = .05$ level. We take this as evidence that the AGirl/ABoy couples are the slowest to have sex. Table 8 shows that the FGirl/MBoy couples are the quickest to have sex, only one third as long as the AGirl/ABoy couples.

Duration of a Relationship

Of the 865 couples available for analysis, 580 provided complete information for the duration of a relationship analysis to test Hypothesis 4.[9] The best model for duration of a relationship is shown in Table 9. We combined the F and M categories of MF into one group to represent MF with two dummy (indicator) variables. Thus, the new MF variables each have two levels and were represented by two indicator variables (FGirl or MGirl, AGirl) for the main effect of girls' MF and two for the main effect of boys' gender (FBoy or MBoy, ABoy). The F or M categories for both boys and girls were omitted from the model and became the reference group. An interaction term between the main effect of girl's MF and the main effect of boy's MF was created and represented by one variable. In addition to the age and MF variables, we included a covariate to indicate if we were using the girls' or boys' report of length of relationship. The interaction term is significant, indicating a true couple effect. The hazard for ending the relationship is greatest for the AGirl/ABoy couple and is lower for all other couples. Table 10 shows these hazard ratios along with the *p* value for testing that the hazard for each couple category is lower than the AGirl/ABoy couple. This table shows that

TABLE 6: Final Cox Regression Model to Predict Time to Sex for Couple

Variable	β (SE)	p *Value*
Age of girl	0.27 (0.08)	< .001
Girls' MF		N/A[a]
F	0.54 (0.34)	
A	*reference*	
M	1.07 (0.43)	
Boys' MF		N/A[a]
F	0.92 (0.27)	
A	*reference*	
M	–0.52 (0.69)	
Interaction		
Girls' MF × Boys' MF		< .001
FGirl/FBoy	–0.94 (0.31)	
FGirl/MBoy	–1.29 (0.62)	
MGirl/FBoy	1.12 (0.74)	
MGirl/MBoy	0.50 (0.76)	
Girl had previous sex partner	1.03 (0.19)	< .001
Boy had previous sex partner	0.35 (0.23)	.132
Boys' response used	–1.01 (0.23)	< .001

NOTE: MF = masculinity-femininity; F = feminine; A = average; M = masculine. The A categories for both girls and boys were omitted from the model and became the reference group. The trichotomized MF variables each had three levels and are represented by three indicator variables (e.g., FGirl, AGirl, MGirl) for the main effect of girls' MF and three for the main effect of boys' MF.

a. Because MF of the boy and girl are predictive as an interaction, no test of significance is done on the main effects for boys' MF or girls' MF.

TABLE 7: Hazard Ratio (HR) Showing the Length of Time the AGirl/ABoy Will Date Before Sex Occurs Relative to a Couple With a Different MF Composition

	FBoy HR (p *value)*	*ABoy* (p *value)*	*MBoy* (p *value)*
FGirl	1.68 (.06)	1.71 (.06)	3.10 (< .001)
AGirl	2.52 (< .001)	*reference*	0.59 (.23)
MGirl	2.03 (.03)	2.92 (.007)	2.87 (.003)

NOTE: MF = masculinity-femininity; F = feminine; A = average; M = masculine; reference = reference group. The trichotomized MF variables each had three levels and are represented by three indicator variables (e.g., FGirl, AGirl, MGirl) for the main effect of girls' MF and three for the main effect of boys' MF. Scores were evaluated at girls' age 16. *p* values in parentheses are for a one-sided test.

TABLE 8: Hazard Ratio (HR) Showing the Length of Time the FGirl/MBoy Couple Will Date Before Sex Occurs Relative to a Couple With a Different MF Composition

	FBoy HR (p *value)*	*ABoy HR* (p *value)*	*MBoy HR* (p *value)*
FGirl	0.54 (.04)	0.55 (.04)	*reference*
AGirl	0.81 (.22)	0.32 (< .001)	0.19 (.004)
MGirl	0.66 (.10)	0.94 (.44)	0.92 (.42)

NOTE: MF = masculinity-femininity; F = feminine; A = average; M = masculine; reference = reference group. The trichotomized MF variables each had three levels and are represented by three indicator variables (e.g., FGirl, AGirl, MGirl) for the main effect of girls' MF and three for the main effect of boys' MF. *p* values in parentheses are for a one-sided test. Scores were evaluated at girls' age 16.

TABLE 9: Final Cox Regression Model to Predict Duration of Relationship

Variable	β (SE)	p *Value*
Age of girl	–0.14 (0.04)	< .001
Girls' MF		N/A[a]
A	–0.081 (0.16)	
FGirl or MGirl	*reference*	
Boys' MF		N/A[a]
A	–0.12 (0.19)	
FBoy or MBoy	*reference*	
Interaction		
Girls' MF × Boys' MF		
AGirl/ABoy	0.55 (0.26)	.033
Boys' response used	0.43 (0.13)	.002

NOTE: MF = masculinity-femininity; F = feminine; A = average; M = masculine; reference = reference group. The trichotomized MF variables each had three levels and are represented by three indicator variables (e.g., FGirl, AGirl, MGirl) for the main effect of girls' MF and three for the main effect of boys' MF.

a. Because MF of the boy and girl are predictive as an interaction, no test of significance is done on the main effects for boys' MF or girls' MF.

TABLE 10: Hazard Ratio (HR) Showing Duration of the AGirl/ABoy Relationship Relative to a Couple With a Different MF Composition

	FBoy or MBoy HR (p *value)*	*ABoy HR* (p *value)*
FGirl or MGirl	0.70 (.05)	0.62 (.014)
AGirl	0.65 (.025)	*reference*

NOTE: MF = masculinity-femininity; F = feminine; A = average; M = masculine; reference = reference group. The *p* values in parentheses are for a one-sided test. Scores were evaluated at girls' age 16.

the AGirl/ABoy couples break up the quickest, lasting only two thirds as long as the other couples.

DISCUSSION

Couple union formation is affected by MF with both main and interaction effects. Reciprocation operates as an individual main effect of MF. Individuals who are more masculine are less likely to reciprocate, whatever the partner's MF. An FGirl/FBoy couple is most likely to reciprocate, and an MGirl/MBoy couple is least likely to reciprocate, but this is not the effect of couple selection by MF. It appears that masculine individuals are less likely to perceive that they are in a romantic relationship.

All other observed effects are interaction effects created by couple selection. Specific MF combinations have different probabilities of having sex. FGirl/MBoy couples are most likely to have sex, and have sex the quickest. AGirl/ABoy couples are NOT the lowest in probability of having sex but they are the slowest to have sex and the quickest to break up. It appears that relationships in which both partners are average MF, with their bland gender combination, cease to hold fascination for their participants, perhaps further shown by the long time it takes them to get around to sex. We speculate that the sharp gender differences found in the FGirl/MBoy couples provide the emotional heat that may be necessary to light the flames of sex. Parents of more feminine girls might be advised to keep fire extinguishers at the ready for the more masculine boys. However, we have advice concerning who needs cooling off. Table 6 shows that the girl's previous sex experience is the stronger predictor of time to sex for the couple. This implies that the decision to go ahead is made by the girl. We therefore recommend that the extinguisher be directed toward the girl.

In fast-moving dating populations such as couples in their 20s, most daters are sexually experienced. Nearly every woman knows that she has only a few encounters to decide to have sex with a particular partner before he departs. In such circles, nascent couples may not get to know one another well enough before sex to be affected by our subtle MF mechanisms. On the other hand, couples contemplating marriage are subject to many instrumental decisions beyond their sexual relationship. Dating relationships are recreational, and few culminate in marriage. It is worthwhile to test whether MF sorts dating couples who marry from those who do not, but we do not propose this as a hypothesis predicting marriage selection.

At other levels of social structure, two-sex couples form nonromantic relationships. These couples include siblings, mother-son, father-daughter, teacher-student, coworkers, and so forth. Their idiosyncratic sex differences, although not formed through selection, nevertheless affect their interaction. We may speculate that the sex differences we identify with sexual attraction in romantic couples may determine erotic attraction in nonromantic pairs. Societal restrictions prohibit sexual

interaction in most of these relationships, but we may predict in what couples the restrictions are likely to be violated. In nonsexual pairs, MF also may predispose nonsexual joint outcomes of a task-oriented nature such as joint problem solving or cooperative task completion. In all opposite sex pairs, we should expect MF differences to be a salient dimension affecting interaction and therefore joint outcomes.

We have embedded our hypotheses of a relationship between couple MF and sex within a theory of the biological foundations of sex-dimorphic behavior. At the individual level, MF has a heritable component. Is there a basis here for the evolutionary integration of couple MF patterns? Suppose that men and women have a genetic propensity to have sex with opposite sex partners whose behavior differences are typical. The mutual propensity of masculine men and feminine women to copulate with one another gives such couples a reproductive advantage over other possible couples. Not only should they produce more offspring, but these children should have a higher probability of maturing into masculine men and feminine women. If this process were active in the environment in which humans evolved, it would have served to maintain or increase sex differences. Because the biological mechanism that generates sex differences is similar across mammals, we could speculate that the pattern described here in adolescent couples may have its analogue in related species.

Limitations

Creation of the couples sample from a large national probability survey, although arguing for the generalizability of the results, would seem to preclude easy replication of the study on account of cost alone. But the basic design could be executed on a small number of large schools. The MF scale should be easy to replicate even with different questionnaire items. Most elements of the design could be replicated through a self-administered, web-based school application. The necessity of having a closed school population containing many romantic and sexual couples limits applicability to adolescents. The omission of couples in which the partner was not enrolled in the same school is a design limitation that omits a significant type of couple. The omission of dropouts is not a problem in Add Health because dropouts were included in initial school rosters and were therefore interviewed at home. The problem is in missing those partners in other schools or who are beyond school age. The absence of boys beyond school age is particularly troublesome because they are the romantic partners of many of our senior-level girls. We can record the existence of such couples from our girls' reports but cannot interview them. We can expect some distortion of our results from their absence.

CONCLUSION

Within-sex individual differences in sex-dimorphic behavior lead to heterosexual couple encounters with diverse gender structures. These different patterns of within-couple gender structure lead couples to different futures. Generally, adolescent couples consisting of a very feminine woman and a very masculine man are more likely to have sex and proceed to sex earlier in their relationships. Couples in which both are near the mean masculinity-femininity for their sex are slower to initiate sex and dissolve their relationships more quickly than couples of more contrasting gender structures.

NOTES

1. A test of independence between the categorized masculinity-femininity (MF) distribution of couples in the analysis and the distribution of couples excluded from the analysis was done using an adjustment to the Pearson chi-square statistic to correct for a complex sampling design. This adjustment produces an *F* statistic and was computed with the svytab command from the Stata software package (Stata Corp., 2001).

2. Although most adolescents appear only once in the data set, a few belong to more than one couple. The structure of the couples' data set is adolescents nested in couples nested in schools. Schools are the primary cluster and are statistically independent. The Stata estimation commands for data from a complex survey and uses a robust variance estimator to implicitly account for any number of levels of nesting. If the primary clusters are independent of each other, then any number of nesting levels can occur within the primary clusters and the survey estimation commands will yield valid inferences (*Stata User's Guide*, 2001, p. 324). Hence, the robust commands will properly account for the nested structure of the couples' data.

3. Because these outcomes are not rare events, the odds will not be a sufficient approximation to the probability of the event occurring. To aid in interpreting the results of our logistic regression analyses, we convert all odds to the probability of the event occurring.

4. We also ran models including terms to test the additional predictability of the squared MF for boys, squared MF for girls, and interaction between boy's and girl's MF score. None of these higher order terms were significant, and they were omitted from the final model.

5. In other studies of adolescent sexual behavior, respondents reported whether they had sex or whether they had sex with a particular person. Usually, no validity check is available. Add Health provides a distinctive validity check. When reciprocating couples were examined, we had two reports of whether sex occurred in the relationship—one from each partner. If all told the truth, there should be no discrepant reports. We found 11% of reciprocating pairs were discordant on ever had sex with one another, but in Add Health, there is a way in which the couples could be discrepant and still both be reporting accurately. Individuals reported their intercourse status in a relationship on the date of interview, but couples were not interviewed simultaneously. Their dates of interview were up to 6 months apart. Respondents reported the month of their first sex with each relationship partner. We examined the discrepant cases individually. If the person saying no was interviewed at a date earlier than the person saying yes, and if the person saying yes gave a date of first intercourse that fell between his and her interview, the cases could be treated as not discrepant. If we treated these cases as not discrepant, we reduced the discrepant cases to 8%. We simply eliminated such cases. The discrepant cases constituted 10% with a high reliability of partner agreement (kappa = .84).

6. A test of independence showed no difference between the categorized MF distribution of couples in the analysis with the distribution of couples excluded from the analysis.

7. We tested the significance of the interaction term by comparing the difference of the fit of the full model and a reduced model that omitted the four interaction components representing the main

effects of the girl's and boy's MF scores. This is the strategy recommended by Stokes, Davis, and Koch (1995), chapter 8.

8. The primary reason for exclusion was missing date information needed to determine time to first sex ($N = 206$). Other reasons for exclusion from the analysis include missing or conflicting information on the occurrence of vaginal sex in the relationship ($N = 68$), sexual intercourse with the partner occurred before the date the relationship started ($N = 12$), and missing information on having a previous sex partner ($N = 95$). A test of independence showed no difference ($p = .63$) between the categorized MF distribution of couples in the analysis and the distribution of couples excluded from the analysis.

9. Reasons for exclusion from analysis include missing or conflicting information for couples reporting currently dating at time of interview ($N = 127$) and missing dates of beginning and ending of relationship ($N = 158$). A test of independence showed a statistically significant difference ($p = .04$) between the categorized MF distribution of couples in the analysis and the distribution of couples excluded from the analysis.

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