Sex Segregation of Friendship Networks
Individual and Structural Determinants of Having Cross-Sex Friends

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Insights from psychological and sociological research are combined to explain why some individuals include more opposite-sex friends in their network than others. Individual determinants include sex-role attitudes and social needs and skills; structural determinants include a person's life course and the composition of settings to which people were exposed. Hypotheses derived from the literature and panel data on young adults in the Netherlands are analysed to test the hypotheses. The results indicate that for women, the chance of having opposite-sex friends is increased by a heterogeneous sex-composition of local settings (schools, work, and associations) and by a high degree of social skills. For men, the chance of opposite-sex friendships is increased by egalitarian sex-role attitudes and by a high degree of loneliness, not by local settings. For both men and women, the chance of having opposite-sex friendships declines sharply over the early life course. When comparing men and women, it is concluded that for women, opportunity structures have the biggest impact, followed by life-course variables and individual characteristics, while for men, individual characteristics are most important, followed by life-course variables and opportunity structures. The relative order of the three explanations thus appears to be the opposite for men and women.

Introduction

Many studies have shown that social interaction in non-romantic relationships rarely crosses gender lines. Child development studies on pre-school children have examined interactions between toddlers through observational methods and show that most of children's play interactions are with same-sex children (Serbin *et al.*, 1994). Playground observations further show that sex segregation of interaction starts at an early age – though earlier among girls than boys – and increases when children are followed from pre-school to elementary school (Maccoby, 1988). Sociologists have used survey data on adults and have found sex segregation as well, although its extent depends on how social interaction is defined. In analyses of the personal networks of discussion partners, Marsden (1990), for example, shows that 62 per cent of all network

dyads are of the same sex, a figure that rises to 75 per cent when considering network members who are not kin.

Sex segregation of friendships and networks is important for several reasons. First, the absence of cross-sex friends may foster in-group feelings and help create gender stereotypes and traditional sex-role attitudes (Maccoby, 1988; Ridgeway and Smith-Lovin, 1999). Secondly, a lack of day-to-day interaction between men and women may reduce understanding of the other sex and may complicate personal communication between men and women in romantic relationships (Sapadin, 1988). Sex segregation may also be a consequence of gender stereotypes and diverging communication styles, or the two processes may operate simultaneously, thereby reinforcing each other. Thirdly, sex-

segregated interaction may have socioeconomic consequences, in part because access to male interaction partners increases the amount of social capital that women are able to accumulate in work organizations (Ibarra, 1992; Smith-Lovin and McPherson, 1993; Verhoeven, Jansen, and Tazelaar, 2000).

What causes people to interact predominantly with same-sex network members and friends? This question has been studied as well, but our understanding of the origins of sex segregation in social interaction is still limited. Perhaps because sex segregation is so pervasive at a young age, most studies have been conducted in developmental psychology. In this field, researchers have related friendship choices of young children to a variety of individual and social characteristics. One hypothesis has been that children avoid cross-sex contacts because boys and girls have different styles of play and different ways of influencing each other (Maccoby, 1988). Other authors have argued that preferences for same-sex peers arise from sex-role socialization and the development of gender roles and gender identification (Martin, 1994). Yet other authors have examined the role of social skills and social adjustment, arguing that opposite-sex friendships are relationships which require special social skills and high levels of self-esteem (Kovacs, Parker, and Hoffman, 1996).

A second field of research into the causes of sex segregation has focused on adult friendships. Psychologists have conducted small-scale surveys, mostly among college students, and have compared the content and meaning of same-sex and opposite-sex friendships. The results of these studies provide indirect clues as to why so few opposite-sex friendships exist. In line with popular belief about sex differences, women report that opposite-sex friendships provide less intimacy, less acceptance, less nurturance, and less emotional support than same-sex friendships (Aukett, Ritchie, and Mill, 1988; Rose, 1985; Sapadin, 1988). This finding has been considered evidence for the notion that men and women have different emotional needs and that such differences hamper the development of cross-sex friendships. For men, opposite-sex friends either provide the same amount of intimacy (Rose, 1985), or even somewhat more intimacy and emotional support than same-sex friends (Aukett,

Ritchie, and Mill, 1988; Sapadin, 1988). This finding points in the direction of different psychological abilities rather than different needs and suggests that both men and women rely more on women for the fulfilment of their emotional needs.

Sociological studies on the causes of sex segregation are scarcer. There has been a rapidly growing number of sociological studies on sex differences, but most of these have focused on other characteristics of friendships and networks, such as the size of support networks, the density of networks and the composition of networks with respect to role relationships, e.g. kin, neighbours, and co-workers (Dykstra, 1990; Fischer and Oliker, 1983; Hurlbert and Acock, 1990; Ibarra, 1992; Marsden, 1987; Moore, 1990; Munch, McPherson, and Smith-Lovin, 1997). Despite this growing body of literature, few sociological studies have systematically tried to explain why some people have more opposite-sex friends than others.

This study addresses three related questions: how often do the friendship choices of young adults cross lines of gender; why do some people include more opposite-sex friends in their network than others; and are the determinants of having opposite-sex friends different for men and women? In answering these questions, I combine insights from psychological and sociological research. First, I examine whether the sex-composition of friendships is influenced by individual characteristics and in particular by sex-role attitudes and the social needs and skills people have. Secondly, I examine whether the prevalence of opposite-sex friendships is affected by structural factors such as a person's life-course experience and the opportunities for interaction that people have. Thirdly, I examine whether these structural and individual effects are the same for men's and women's friendship choices. The analyses are based on data on 'best friends' from a nationally representative panel study of 730 young adults in the Netherlands.

Hypotheses and Earlier Findings on Cross-Sex Friendships

I consider four types of factors that may affect sex-segregated interaction:
-   opportunity structures;

- life-course influences;
- sex-role attitudes; and
- social adjustment.

The first two factors have mostly been examined in sociological research, although some developmental psychologists have pointed to such factors as well (Kovacs, Parker, and Hoffman, 1996; Maccoby, 1988). These factors are considered part of a supply-side theory of interaction, which argues that choices are driven by the available pool of interaction partners (Marsden, 1990). The last two factors have been studied most extensively in psychological studies and are part of demand-side theories of interaction, which emphasize the preferences people have to meet and select a specific type of partner. Such preferences arise from the needs and skills people have, as well as from the expected rewards of different types of interaction.

Opportunity Structures

As has been shown extensively in research on marriage and friendship, the choice of partners for personal relationships is constrained by the opportunities people have to meet and interact with others. That people generally form relationships with others who are socially or culturally similar to themselves is therefore not simply an outcome of in-group preferences, but is also caused by the fact that interaction opportunities are not distributed randomly (Blau and Schwartz, 1984; Flap, 1999; Kalmijn and Flap, 2001). The dominance of same-sex friends thus in part reflects that meeting opportunities in society are structured along gender lines.

Important examples of segregated settings are voluntary associations, schools, and workplaces. Such settings are an important source of finding friends, particularly for young adults. Past research has shown that many voluntary associations are sex-segregated (McPherson and Smith-Lovin, 1986), and hence we expect that people who participate in such associations, and particularly people who participate in sex-segregated associations, will be less likely to have opposite-sex friends. In a similar way, schools can be segregated, either because there are non-coeducational schools (although these are now rare in the Netherlands), or because fields of study are segregated by sex. Because fields of study in the Netherlands generally function as separate

sub-schools within schools, one would expect that people who have studied in a field with relatively more students of the opposite sex will have more opposite-sex best friends.

The sex composition of workplaces is another factor in the formation of informal relationships (South et al., 1982; Straits, 1996). It is often argued that women who participate in the labour market are more likely to have opposite-sex friends than other women. The main reason is that the relative number of potential male friends is higher at work than in the settings in which non-working women are involved, such as neighbourhoods and voluntary associations. It is also known, however, that many women work in female-dominated occupations and in female-dominated work settings. Hence, an additional expectation is that for people who work for pay, the relative number of same-sex employees at work lowers the likelihood of having opposite-sex friends (Straits, 1996). While labour-force participation primarily affects women's friendship networks, the sex ratio at work should affect both men and women's friendship choices.

The family is generally considered more heterogeneous with respect to sex than other settings (Marsden, 1990). There is also variation in the sex composition of the family, depending, for instance, on how many brothers or sisters a person has. The proportion of female or male kin will affect opposite-sex friendship choices because siblings and parents, as well as uncles and nieces, can be friends themselves, and because their networks can be a source of friends for the individual. Another reason to expect opposite-sex siblings to increase opposite-sex friendships is that interacting with one's sisters or brothers at an early age enhances understanding of the other sex and may help overcome communication problems between men and women later in life (Burker, Goldstein, and Caputo, 1981; Kovacs, Parker, and Hoffman, 1996).

The hypothesis about opportunity structures has not often been tested in the context of opposite-sex friends. Two studies have shown that women's informal contacts with male co-workers are more frequent when the proportion of male workers in a work setting or an occupation increases (South et al., 1982; Straits, 1996). For men, increases in the proportion of female workers do not appear to increase informal opposite-sex contacts. Other

studies have focused on children and show that the sex composition of classrooms has weak effects on opposite-sex friendship choices (Kovacs, Parker, and Hoffman, 1996). While perhaps obvious from a theoretical point of view, hypotheses about the effects of opportunities appear more uncertain from an empirical point of view.

Life-Course Influences

Friendship networks are often considered to become more segregated when people start dating, get married, and have children. There are several reasons to expect such an effect. In a society with salient boundaries between male and female spheres, the potential of sexual attraction in cross-sex friendships is often perceived to be a problem (Carter and McCloskey, 1983; O'Meara, 1989). This view has important consequences for people who are romantically involved themselves. First, there are norms in the community saying that it is inappropriate for married men and women to become intimate friends with someone of the opposite sex (Booth and Hess, 1974). Secondly, a spouse may regard an opposite-sex friendship as competing with the marriage or may perceive the friend as a threat. As a result, a married person may decide to interact with such friends less intensively. For these reasons, we would expect that opposite-sex friends become less common when a person gets married or begins to cohabit. Similarly, we would expect that persons who are dating have fewer opposite-sex friends in their network than single people.

A different reason to expect an increase in sex segregation over the life course is that marriage and child-rearing often go hand in hand with sex role specialization. Child-rearing, for instance, increases the importance of kin in a person's network, and this applies particularly to relationships between female kin (Munch, McPherson, and Smith-Lovin, 1997). Child-rearing may also introduce other mothers into the woman's network because mothers share experiences with each other and are likely to meet each other in the neighbourhood during the daytime (Wellman, 1985). For this reason, one would expect that for women, sex segregation increases after the birth of children. Similar effects may occur for men. Once married, men engage in paid work, are focused on their colleagues, who are usually male, and also

take on their own hobbies and sports, which tend to be male-oriented. In a more general sense, specialization of paid and domestic labour, as well as specialization of leisure pursuits, creates a separation of male and female spheres in marriage. Although specialization is not as dominant now as it used to be, such a separation of spheres may result in sex-homogeneous networks of both husbands and wives, which leads to a decline in the proportion of opposite-sex friends during marriage.

The effects outlined above are dampened by the influence spouses have on each other's network. From the literature on social networks and intimate relationships, it is well-known that the extent to which the networks of couples overlap increases over the course of the relationship (Milardo, 1982). The notion of increasing overlap after engagement or marriage implies that husbands and wives introduce part of their networks to each other (Booth and Hess, 1974; Wellman, 1985). Since these networks are segregated, the spouse may also acquire new opposite-sex friends. These newly introduced friends are also less likely to be perceived as a source of threat to the existing relationship, largely because they are tied to both members of the couple. The tendency of spouses to introduce their networks to each other suggests that the hypothesis about life-course differences needs to be qualified. More specifically, we may expect that the increase in sex segregation over the life course should primarily be observed for friends who existed before the couple met. Hence, it is 'old' friends of the opposite sex that will be dropped from the network as people marry and have children. In addition, we may expect that 'new' friends are more likely than 'old' friends to be of the opposite sex, largely because they are introduced by the spouse.

Two previous studies have found life-course effects, but the patterns are not so clear. In an older study of middle-aged adults, Booth and Hess (1974) found that married women have more opposite-sex friends than divorced and never married women, supporting the notion that spouses introduce cross-sex friendships to the marriage. Men's networks were not affected, suggesting that the husband's network dominates the joint network. In an analysis of discussion networks of couples with children, Munch, McPherson, and Smith-Lovin (1994) show that the proportion of women in men's

networks is highest in the early child-rearing years and lowest in the later stages of child-rearing. Although this supports the notion of spousal network introduction, further analyses show that this effect is due to the inclusion of the spouse in the network. Husbands report the wife more often as a network member when their children are young, not the female members of the wife's network (Munch, McPherson, and Smith-Lovin, 1994: 517).

Sex-Role Attitudes

Involvement in same-sex contacts may also arise from individual influences. A first type of individual influence lies in sex-role attitudes. It is well-known that people generally prefer to interact with people who are similar to themselves, partly because similarity leads to mutual confirmation and affection, and partly because similarity eases communication. When people perceive large differences between men and women and when they perceive differences within their own sex-group to be small, they would expect relationships with the other sex to be less satisfying or more difficult to maintain. The expected rewards of such friendships would be lower. For this reason, one would expect involvement in same-sex friendships to be related to sex-role socialization. People with traditional orientations towards sex roles, will perceive larger differences between men and women, will develop a stronger sense of in-group identification and will therefore expect fewer rewards from opposite-sex friendships. In addition, people with traditional views on gender roles may also be stronger advocates of norms against cross-sex friendships, in part because such friendships are believed to threaten the boundaries between the sexes.

Tests of this hypothesis can be found in research on child development, but the evidence is mixed. Martin (1994) found a positive association among pre-schoolers between knowledge of sex-typed behaviour, on the one hand, and liking and playing with same-sex children on the other. Fagot, Leinbach, and Hagan (1986) also found a positive correlation between gender labelling and same-sex friendship choices, but Moller and Serbin (1996) found no association between playing with same-sex peers and awareness and knowledge of gender roles. Most of these studies are concerned with

cognitive processes and therefore use measures of gender labelling and identification, e.g. they ask children whether they are able to correctly identify the sex of a sex-stereotyped toy or picture of an adult (Fagot, Leinbach, and Hagan, 1986). Such gender discrimination tasks do not pertain to what people think is appropriate to do for men and women in society; they lack a normative component. Studies of older children have sometimes used more normative measures of gender roles and these show that sex-role attitudes are negatively correlated with having opposite-sex friends (Kovacs, Parker, and Hoffman, 1996).

The relationship between sex-role attitudes and network composition is often believed to result from mutual causal influences. People with traditional sex-role attitudes may avoid cross-sex friendships, but gender roles may also develop because there is so little intimate day-to-day interaction between men and women. Most likely, both causal processes operate at the same time (Maccoby, 1988; Ridgeway and Smith-Lovin, 1999). The studies mentioned above are all based on cross-sectional data. As has been noted repeatedly in these studies, panel data are needed to conduct a firm test of the notion that traditional sex-role attitudes reduce intimate interaction between men and women.

Social Adjustment

A second type of individual influence lies in the social needs and skills that people have. The literature suggests two different hypotheses in this context. The first hypothesis is based on the notion that there are differences in communication styles between men and women. Such differences make opposite-sex relationships more difficult to establish and to maintain, and these difficulties can be overcome more easily when people have more social skills (Kovacs, Parker, and Hoffman, 1996). In addition, because opposite-sex friendships are sometimes considered deviant in one's social setting, a person who wants to become friends with a member of the opposite sex runs the risk of being rejected by that person. For that reason as well, it has been suggested that opposite-sex friendships require better than average social skills and more self-esteem.

A second hypothesis links opposite-sex friends to more negative social functioning. It has been argued, for instance, that people who have opposite-sex friends are more isolated socially (Kovacs, Parker, and Hoffman, 1996). One reason for this is that rejection by same-sex peers leads individuals to develop alternative strategies for seeking contact. One such strategy may be that people try to make friends outside the normatively prescribed group. As a result, one would expect that men and women who are more isolated socially have a larger proportion of opposite-sex friends. The reverse process may occur as well. Because there are norms against cross-sex friendship, people who are involved in opposite-sex friendships may be rejected by peers and therefore experience more isolation (Carter and McCloskey, 1983).

The relationship between isolation and segregation also suggests an interaction effect. Women are generally better at offering emotional support in friendship than men (Aukett, Ritchie, and Mill, 1988; Caldwell and Peplau, 1982). When people experience social isolation, they will have a greater need for intimacy than others. As a result, these people will more often turn to women than to men for support. For men, this implies that they will seek to have contact with opposite-sex individuals; for women, it implies that they will seek to have contact with same-sex individuals. Hence, it is only for men that social isolation may increase the chance of having opposite-sex friendships. Note that by finding such opposite-sex friendships, loneliness may be reduced, but probably not to a level that is comparable to that of people who were not socially isolated in the first place.

The two hypotheses suggested above imply more or less opposing processes. The first hypothesis suggests that people with high social skills are more likely to develop opposite-sex friendships; the second suggests that people who are socially isolated are more likely to have such friends. In an attempt to resolve this issue, Kovacs, Parker, and Hoffman (1996) divided elementary-school children into three groups: children who had same-sex friends only, children who had opposite-sex friends as well as same-sex friends (secondary opposites), and children who primarily had opposite-sex friends (primary opposites). The groups were compared in terms of their social competence (based on teacher

reports) and their degree of self-esteem (based on self reports). The results showed that primary opposites had lower self-esteem than both other groups, while the secondary opposites had higher degrees of self-esteem than the same-sex group. In addition, primary opposites had lower degrees of social competence than the two other groups, while secondary opposites did not have lower degrees of social competence than the same-sex group. The authors conclude that the more negative hypothesis about social isolation applies to the group of children who primarily have opposite-sex friends, while the more positive hypothesis about social skills and self-esteem fits the group of children who have both opposite and same-sex friends (Kovacs, Parker, and Hoffman, 1996: 2283).

Data and Measures

The four general hypotheses discussed above have been studied in different segments of the literature. In this contribution, I consider all four hypotheses and test them simultaneously in one longitudinal analysis. For this end, I use data from a study of young adults in the Netherlands, the Panel Study of Social Integration in the Netherlands (Liefbroer and Kalmijn, 1997). This survey contains data on a random sample of individuals born between 1961 and 1969, who were living in a representative sample of 25 municipalities in the Netherlands in 1987. Respondents were first interviewed in 1987, when they were 18 to 26 years of age, and were interviewed again in 1991 and 1995. Respondents were interviewed at home with a combination of structured interview schedules and self-administered questionnaires. The analyses reported here are based on respondents who participated in all three waves and who had valid data on all network variables (N=730). In the Appendix, I assess whether attrition from the panel was selective and I apply a sample-selection model to correct for possible selectivity.

The Friendship Module

In the third wave, when respondents were 26 to 34 years of age, they were asked the following question: 'The next questions are about the people that you

consider to be your five best friends, excluding your possible partner and children. If you have fewer friends, do not fill out each column.' Respondents were then asked to give the initials of these friends. For each of those friends, they had to answer a series of questions, such as questions on the demographic characteristics of their friends, the relationship of the friend to ego, and selected other characteristics of the relationship. The central variable in this study is the number of opposite-sex friends divided by the total number of friends (expressed as an individual percentage).

By using the word friend in the introductory question, my analysis differs from some earlier studies which focused on so called discussion or interaction networks (e.g. Marsden, 1987; Moore, 1990). The focus in this paper is essentially on the strongest and most affective ties in the network. We have to bear in mind that the phrase 'best friend' may have a different meaning for different social groups (Allan, 1979). Note that the partner was explicitly excluded, not only for married persons, but also for persons with a dating relationship. Further note that a negligible proportion of respondents mentioned no friends or did not want to answer the network questions (4 per cent). Following earlier research on personal networks (Moore, 1990), these respondents are left out of the analyses.

Measures of the Independent Variables

Four settings are considered to tap the effect of opportunity structures:
- The proportion of same- and opposite-sex siblings: whether the respondent has any same-sex siblings, whether he or she has any opposite-sex siblings, and having no siblings (the reference category).
- The perceived proportion of men and women in the most important voluntary association at age 18, on a five-point scale, converted into percentages, ranging from 20 per cent for 'mostly opposite-sex' to 80 for 'mostly same-sex' (respondents who did not participate in a voluntary association were assigned a score of 50).
- The proportion of men and women in the respondent's last field of education, distinguished into eight fields of university training and eight fields of lower or higher vocational training. The numbers of men and women in these fields were calculated from external survey data (Social and Cultural Planning Bureau, 1991). Respondents with general schooling only were assigned a score of 50.
- The perceived proportion of men and women in the respondent's first job after leaving school, on a five-point scale and recoded from 20 to 80

Table 1. *Means and ranges of independent variables*

	Mean	**Range**
One or more same-sex siblings	0.70	0–1
One or more opposite-sex siblings	0.70	0–1
Percentage same sex in associations (at age 18)	57	20–80
Percentage same sex in last school	63	8–92
Percentage same sex in first job	60	20–80
Participation in associations (at age 18)	0.62	0–1
Paid work (wave 3)	0.78	0–1
Single (wave 3)	0.17	0–1
Dating (wave 3)	0.09	0–1
Married/cohabiting without children (wave 3)	0.32	0–1
Married/cohabiting with children (wave 3)	0.41	0–1
Liberal sex-role attitudes (waves 1 and 2; $\alpha = 0.75, 0.77$)[a]	0[b]	-4.2–1.3
Extraversion (wave 1 and 2; $\alpha = 0.79, 0.81$)[a]	0[b]	-2.6–2.4
Self-esteem (wave 1 and 2; $\alpha = 0.86, 0.87$)[a]	0[b]	-3.9–2.0
Loneliness (wave 1 and 2; $\alpha = 0.76, 77$)[a]	0[b]	-0.8–6.7

[a]Cronbach's alpha for first and second wave.
[b]Scores are standardized.

(respondents who had never worked were assigned a score of 50).

In addition to measures of the sex-composition of settings, I include two other structural variables: participation in a voluntary association at age 18, and whether the respondent worked for pay at the time of the last interview. The age range of the respondents in the last wave (26 to 34) makes it possible to consider four (early) life-course stages: being single (the reference category), dating (defined as going steady for at least three months), married (or unmarried cohabitation) without children, and married (or cohabiting) with children.

To measure individual influences, I use one scale for sex-role attitudes and three scales for social adjustment (De Jong and Liefbroer, 1998):

- A scale of liberal sex-roles which measures the degree to which respondents were in favour of egalitarian practices at home and in society. Examples of statements are 'women are better suited for child-rearing,' and 'it is unacceptable for women to be supervisors'.
- A scale of loneliness developed by De Jong-Gierveld and Kamphuis (1985) which measures the experience of an unpleasant or intolerable lack of social contact of a sufficient quality. Examples of items are 'I miss nice people around' and 'I feel closely connected to people.'
- A scale of extraversion which measures the degree to which someone is oriented towards the external world rather than towards the self. People who are extravert usually like the company of others and are more socially skilled. Examples of items are 'I am a talkative person' and 'I can easily liven things up'.

- A scale of self-esteem which measures the degree of appreciation of one's self-worth. High degrees of self-esteem are expected to be positively correlated with social skills and will make it easier for people to establish opposite-sex contacts. Examples of items are 'I have a low impression of myself' and 'I have little faith in my abilities'.

Because the causal order may be reversed (networks affecting individual traits), I use information on individual characteristics from the first two waves (1987 and 1991) while using network information from the last wave (1995). This implies that I consider the effects of prior individual characteristics on later friendship patterns. The four scales are constructed by summing standardized items, using factor scores as weightings. The factor scores are obtained from a confirmatory factor analysis with a single factor for each scale. Descriptive statistics for all independent variables are presented in Table 1.

Results

Descriptive Results

Young adult men and women in the Netherlands on average report 20 per cent of opposite-sex persons and 80 per cent of same-sex persons among their best friends (Table 2). A little more than half of the respondents report no opposite-sex friends at all. The proportion of opposite-sex friends is significantly higher for men than for women, although the difference is not large (22 versus 17 per cent). Differences between men and women are possible because friendship choices need not be mutual: a man may consider a particular woman to be among

Table 2. *Number of reported best friends by sex of friend and sex of respondent*

	All	Men	Women	Test of difference
Mean number of friends	3.8	3.9	3.8	1.11[a]
Mean number of same-sex friends	3.0	2.9	3.1	1.73 ~[a]
Mean number of opposite-sex friends	0.8	0.9	0.7	3.84*[a]
Mean percentage opposite-sex	19.5	22.3	16.7	3.35*[a]
Percentage reporting any opposite-sex	51.6	55.7	47.5	4.88*[b]
Number of respondents	730	370	360	

[a]T-test of difference between means of men and women.
[b]Chi-square test of difference between proportions of men and women.
Note: Respondents could report a maximum of five best friends.
~ $p < 0.10$; * $p < 0.05$ (two-tailed test).

Table 3. *Role characteristics and interaction frequency of same- and opposite-sex friendship dyads*

	Male same-sex dyads	Female same-sex dyads	Opposite-sex dyads	Chi-square[a]
Row percentages	38.8	39.8	21.4	
Role relationship (column percentages)				11.0~
Kin	18.0	24.1	30.8	
Colleagues	7.6	6.4	6.7	
Neighbours	8.5	9.0	5.7	
Others	65.9	60.6	56.9	
Frequency of talking to one another (column percentages)				3.9
Once a week	51.0	56.4	50.7	
Once a month	37.6	35.5	41.3	
Less often	11.4	8.1	8.0	
Number of dyads	1087	1114	598	

[a]Test for equality of percentages across the three types of dyads; the sample was weighted by 1/(number of friends).
~$p < 0.10$; *$p < 0.05$; **$p < 0.01$ (two-tailed test).

his five best friends while that particular woman does not consider him among her five best friends. Although I do not have a closed population, these results at least suggest that men's choices are more often unreturned than women's choices. Such asymmetries are interesting but they are not the central concern of this study.

In Table 3 I shift the unit of analysis to the dyad and make comparisons between male same-sex dyads, female same-sex dyads, and mixed-sex dyads. This analysis indicates that of all dyads in the sample, 21 per cent are of the opposite sex and 79 per cent are of the same sex (either all male or all female). The analyses further show that most friendships (about 2 out of 3) are not functionally related, i.e. not kin, neighbours, or colleagues. Moreover, we see that female friendships are more often between kin than male friendships, and that cross-sex friendships are more often between kin than same-sex friendships. Although this confirms the notion that kin are a source of network heterogeneity with respect to sex (Marsden, 1990), even in mixed-sex dyads, the majority are not kin-related. Finally, we observe that interaction in mixed dyads is equally frequent as interaction in male dyads, but somewhat less frequent than interaction in female dyads. Although these differences are not statistically significant, the tendencies are consistent with small-scale studies of friendships (Aukett, Ritchie, and Mill, 1988).

Regression Results

To test the hypotheses about opportunity structures, life-course factors, sex-role attitudes, and social adjustment, I analyse the data from an individual perspective and use an individual's percentage of friends who are of the opposite sex as the central dependent variable. This is a continuous variable which ranges from 0 to 100. I estimate a series of regression models: Model A contains measures of opportunity structure, Model B contains life-course variables, Model C contains indicators of sex-role attitudes and social adjustment, and Model D includes all variables. Models were estimated separately for women (Table 4) and men (Table 5). Because the dependent variable is continuous, the regression models are estimated using OLS. The distribution of this variable is skewed, however, with many observations at zero (no opposite-sex friends) and the rest dispersed between 20 and 100 per cent. As a result, the normality assumption of OLS regression is violated. I therefore check if the results are different when a Tobit regression model is used. These results are also presented in Tables 4 and 5 and reveal no important differences.

In all models, I control for the level of education and the number of reported friends. The latter variable is included because the probability of including someone of the opposite sex increases with the number of friends that people report. I do

Table 4. *Multivariate regression of women's percentage of opposite-sex friends on selected characteristics: unstandardized regression coefficients* (N=360)

	Model A	Model B	Model C	Model D	Model D[a]	Model D[b]
Opportunity structure						
Same-sex siblings[c]	−5.81**			−5.39*	−5.31*	−9.11*
Opposite-sex siblings[c]	−2.94			−2.86	−2.75	−7.51
Same-sex ratio associations	−0.19*			−0.18*	−0.18*	−0.30
Same-sex ratio last school	−0.09*			−0.08*	−0.08*	−0.18*
Same-sex ratio first job	−0.14*			−0.15**	−0.15**	−0.30**
Participation in associations	3.93*			4.44*	4.43*	7.74*
Paid work (vs. no work)	6.36**			4.57*	4.67*	8.93*
Life course variables						
Dating[d]		−4.93		−5.67	−5.88	−9.14
Married no children[d]		−0.72		−2.48	−2.13	−4.28
Married with children[d]		−7.62*		−7.63**	−6.73*	−16.34**
Values and individual traits						
Liberal sex-roles (z-score)			0.24	−0.05	0.31	0.08
Extraversion (z-score)			−0.81	−0.89	−0.97	−1.94
Self-esteem (z-score)			2.81**	2.33*	2.15*	4.80*
Loneliness (z-score)			1.28	1.28	0.74	3.33
Other parameters						
Number of friends	3.29**	3.19**	3.74*	3.26**	3.32**	10.73**
Lower educated	3.35	3.80	1.29	4.06	3.95	7.52
Constant	26.05**	7.75	2.52	31.70**	23.33*	12.86
λ					7.50	
ρ					0.37	
R-squared	0.122	0.070	0.062	0.151		

[a]Based on Heckman's two-stage estimator for sample selection bias (see appendix for selection equation).
[b]Based on Tobit maximum likelihood estimation (without controlling for sample selection bias).
[c]No siblings is the reference group.
[d]Single respondents are the reference group (married includes unmarried cohabitation).
*$p < 0.05$; **$p < 0.01$ (one-tailed test).

not include other characteristics of the network in the model, such as the proportion of kin or neighbours. Such characteristics are related to the sex-composition of networks (Table 2), but it is difficult to regard them as causally prior to the number of opposite-sex friends. It is more like that the choice of kin or non-kin friends and the choice of same-sex or opposite-sex friends are made simultaneously. Age was also not included in the analysis because the age range is small.

The regression results first show that for women, exposure to mixed settings reduces the degree of sex segregation of friendship networks (Table 4). I find that all three sex ratios have a significant effect on

opposite-sex friendships. A larger proportion of same-sex members in voluntary associations, in the last school, and in the first job, is negatively associated with the percentage of opposite-sex friends. These effects persist when including the other variables in the model (Model D). The magnitude of the effects is substantial. The coefficient for the effect of the composition of work settings is −0.15 and the range of that variable is between 20 and 80. Hence, women in the most 'female' type of jobs have ($60 \times 0.15 =$) 9 percentage points fewer opposite-sex friends than women in the most 'male' type of jobs. For voluntary associations, the implied effect is 10.8 percentage points, and for schools the effect is 6.7

Table 5. *Multivariate OLS regression of men's percentage of opposite-sex friends on selected characteristics: unstandardized regression coefficients* (N=370)

	Model A	Model B	Model C	Model D	Model Dᵃ	Model Dᵇ
Opportunity structure						
Same-sex siblingsᶜ	1.41			1.79	1.80	2.75
Opposite-sex siblingsᶜ	0.12			0.98	0.99	1.81
Same-sex ratio associations	−0.17			−0.15	−0.15	−0.25
Same-sex ratio last school	0.02			0.06	0.05	0.08
Same-sex ratio first job	−0.08			−0.06	−0.06	−0.09
Participation in associations	−0.73			1.73	1.73	2.55
Paid work (vs. no work)	−2.66			0.81	0.87	2.59
Life course variables						
Datingᵈ		−4.76		−6.18	−6.18	−10.12
Married no childrenᵈ		−7.96**		−7.25*	−7.21*	−13.45*
Married with childrenᵈ		−10.58**		−8.66**	−8.56**	−15.61**
Values and individual traits						
Liberal sex-roles (z-score)			3.31**	3.74**	3.79**	6.78**
Extraversion (z-score)			0.03	0.32	0.26	0.56
Self-esteem (z-score)			−0.77	−0.89	−0.91	−1.64
Loneliness (z-score)			5.25**	4.39**	4.38**	6.44**
Other parameters						
Number of friends	4.72**	4.46**	5.07**	4.76**	4.77**	12.26**
Lower educated	−0.31	−0.89	1.25	1.93	1.88	1.72
Constant	19.58*	11.61**	2.68	15.39	14.36	−19.22
λ					0.98	
ρ					0.04	
R-squared	0.084	0.095	0.141	0.164		

ᵃBased on Heckman's two-stage estimator for sample selection bias (see appendix for selection equation).
ᵇBased on Tobit maximum likelihood estimation (without controlling for sample selection bias).
ᶜNo siblings is the reference group.
ᵈSingle respondents are the reference group (married includes unmarried cohabitation).
*$p < 0.05$; **$p < 0.01$ (one-tailed test).

percentage points. Since the average percentage of opposite-sex friends among women is about 20, these are strong effects.

Another important finding is that women who participate in the labour market have about 5 percentage points more opposite-sex friends than other women. Women who participated in voluntary associations when they were young, are also more likely to have opposite-sex friends than other women. The family of origin does not have a clear influence. Women with same-sex siblings have fewer opposite-sex friends than women without siblings. Although this is in line with what I

expected, I do not find an effect of having opposite-sex siblings. We expected that women with opposite-sex siblings would have more opposite-sex friends than women without siblings, but the data show no statistically significant difference.

For men, none of the indicators of opportunity structure affect the composition of friendship networks (Table 5). Effects are sometimes in the expected direction, but they are never statistically significant. These results seem to suggest that men are less sensitive to the sex composition of the settings to which they were exposed. This result is
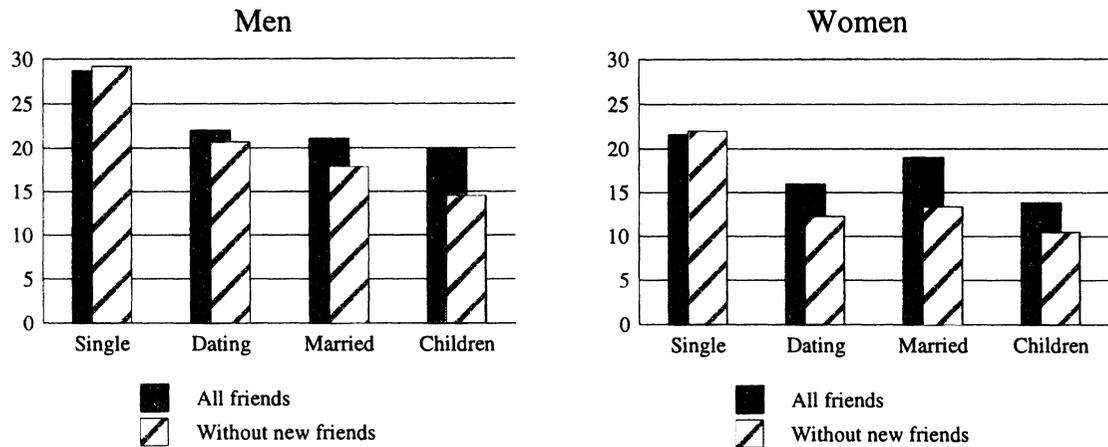
Figure 1. *Predicted percentage of opposite-sex friends by life-cycle stage for all friends, and for friends excluding people who became friends after becoming involved with the partner*

consistent with an earlier study which showed that women's opposite-sex co-worker choices were more strongly affected by the percentage of women in an occupation than men's opposite-sex co-worker choices (Straits, 1996). Why women are more affected by structural conditions will be discussed in the conclusion.

Model B reveals how the prevalence of opposite-sex friends differs across life-course stages. In line with what was expected, I observe that sex segregation increases over the life course. For men, I notice a more or less gradual decline, although the decline is clearest in the first stages: men who are dating have 4.8 per cent fewer opposite-sex friends than single men, men who are married or cohabiting have 8.0 per cent fewer opposite-sex friends, and men with children have 10.6 per cent fewer opposite-sex friends. This decline persists when controlling for the other variables in the model (Model D). For women, I notice a decline in the proportion of opposite-sex friends as well, but the pattern is more irregular. Dating reduces the percentage of opposite-sex friends in the network, but the effect of marriage is weaker than the effect of dating. The strongest decline for women occurs during the child-rearing years – a decrease of 7.6 percentage points. This finding suggests that it is particularly the child-rearing stage that leads to a separation of male and female spheres. To illustrate the life-course effects, I present the predicted percentage of

opposite-sex friends for each of the four life-course stages in Figure 1. The predictions are obtained from Model D and are evaluated at the mean of all other variables in the model.

Earlier, it was argued that spouses may also introduce their networks to each other and that such network members would often be of the opposite sex. To examine this, I focus on respondents who are involved in dating, cohabiting, or married relationships, and compare friends who were already friends of the respondent before he or she met the partner ('old' friends), with friends who became friends during the couple relationship ('new' friends). Although new friends are not necessarily introduced by the spouse, they are more likely to be introduced by the spouse than old friends. For men, it appears that 17 per cent of their old friends were of the opposite sex, compared to 25 per cent of their new friends. Similar differences are observed for women: 12 per cent of the old friends were of the opposite sex and 21 per cent of the new friends were of the opposite sex. These findings are consistent with the notion that the spousal network leads to network heterogeneity.

Because the mechanism outlined above may reduce the tendency of networks to become more homogeneous over the life course, I estimated the regression model again, this time excluding network members who became friends after the respondent entered his or her relationship. In other

words, the dependent variable in this model is the percentage of 'old' friends who are of the opposite sex. For single respondents, the percentage of opposite-sex friends among all friends was used. To illustrate the differences between the outcomes of these regression results, I present the predicted percentage of opposite-sex friends for the two groups of friends in Figure 1 (for all friends and for friends excluding new friends).

When considering all friends for men first, Figure 1 shows a steady decrease in opposite-sex friendships over the life course, as was observed above. When new friends are excluded, the decrease in the percentage of opposite-sex friends is stronger. For women, I also notice a sharper drop in opposite-sex friends when leaving out new friends, although the pattern is less convincing. In general, these findings show that there are clear increases in sex segregation over the life course, that this tendency is dampened by the spousal network, and that the life-course effect therefore applies particularly to 'old' friends.

The influence of sex-role attitudes is examined in Model C. In line with earlier research on child development, I find that sex-role attitudes are an important factor in friendship choices. Men who had traditional sex-role attitudes in the first two waves of the panel, were less likely to include opposite-sex friends in their network in the last wave than other men. This effect does not disappear when other variables are included in the model. For women, I do not find effects of sex-role attitudes. In general, these findings are consistent with the notion that sex segregation of networks is caused in part by existing gender ideologies. That I do not find effects of women's sex-role attitudes may be related to the fact that the variance among women's emancipatory attitudes is smaller than the variance among men's attitudes (numbers not reported in the table).

The effects of social adjustment are also presented in Model C. Three scales are included: extraversion, self-esteem, and loneliness. The first two scales are related to social skills. We expected that people with greater social skills would have more opposite-sex friends. The third scale, loneliness, is a measure of social isolation and is expected to increase the proportion of opposite-sex friends. When looking at the parameter estimates, I observe

differential effects for men and women. For men, I find no support for the notion that social skills positively affect opposite-sex friendships. Men who were extravert and men who had high degrees of self-esteem in the first waves, are no more likely to have opposite-sex friends in the last wave. For women, in contrast, I do find support for this hypothesis. Women who had higher self-esteem in the early waves are more likely to include men in their friendship networks at the last interview. The effect is modest in size: 2.3 percentage points more opposite-sex friends for each standard deviation increase in self-esteem.

The effects of social isolation reveal the opposite pattern. Men who reported high degrees of loneliness in the first waves are more likely to include women in their network later on. This is in line with our expectation. The effect is not small either: 4.4 percentage points more opposite-sex friends for each standard deviation increase in loneliness. For women, I find no effect. Women who reported high degrees of loneliness do not report more opposite-sex friends. It thus appears that loneliness is a relevant factor for men but not for women. My interpretation of this effect was that loneliness creates a social need that encourages people to find support from women. Only for men does this imply an increase in opposite-sex friendships. The results of Model C are consistent with this interpretation.

Conclusion and Discussion

This study has shown that the tendency to choose same-sex close friends is related to both structural and individual influences. First, I have shown that interaction opportunities matter, as revealed by the effects of the sex composition of work settings, schools, and voluntary associations. That the segregation of male and female spheres in various settings affects interaction between men and women has been shown before for colleagues and for schoolchildren; this study shows that segregation also affects the more intimate, and seemingly private, choices that people make – the choice of their best friends. Moreover, I am able to rank the importance of the various opportunity structures: associations are most important, closely followed by schools,

while work settings are of intermediate importance and the family is not important. Although these findings support a more general supply-side perspective on social interaction, I also find evidence that men's choices are affected to a much weaker extent by the composition of settings than women's choices. This suggests that women in a men's world are more likely to develop cross-sex ties than men in a women's world. It is not entirely clear how to interpret this finding, but it may arise from the different functions of opposite-sex friendships for men and women. A common assumption is that opposite-sex friendships for men are motivated by emotional needs, while for women, such friendships are motivated by more general and more diverse needs. If this is indeed the case, one may expect opportunities for contact to matter less for men than for women, because one could argue that meeting opportunities have weaker effects when the type of relationship sought is more intimate.

Secondly, I have shown that friendship networks become more segregated as people move through the early life-course stages. For women, child-rearing is the most salient stage, for men, the increase is more gradual. These effects have already been suggested in early work on marriage and networks, but have not yet been tested or confirmed convincingly. Several mechanisms play a role here, such as specialization in marriage and the presumed conflict between romantic relationships and opposite-sex friendships. I also find evidence that the spousal network affects sex segregation of friendships. People who were friends before a person met his or her partner are less likely to be of the opposite sex than people who became friends during the marriage. This suggests that a spouse introduces opposite-sex members to a person's network. When limiting the analyses to 'old' friends, I find that the increase in segregation during the life course is stronger, suggesting that in particular old opposite-sex friends are being dropped from the network as people marry and have children.

The composition of friendship networks also depends on individual characteristics. My analyses show that men with traditional sex-role attitudes are less likely to include opposite-sex friends in their network. Cross-sectional research on children has shown that gender stereotypes are related to

patterns of interaction, but the causal direction of this effect has remained uncertain. In this study, sex-role attitudes were measured long before people reported on their network, which provides stronger support for the notion that gender-role ideologies precede patterns of social interaction.

Finally, I have linked the composition of friendships to social needs and skills. In the literature, somewhat contradictory notions have been suggested. On the one hand, opposite-sex friendships have been associated with greater social skills and higher levels of self-esteem. On the other hand, opposite-sex friendships have been linked to social isolation. I find support for both notions, depending on whether we look at men or women. For men, social isolation increases the percentage of opposite-sex friendships, for women, high degrees of self-esteem increase the percentage of opposite-sex friendships. Why are these effects different? One interpretation lies in the often suggested notion that opposite-sex friends serve a different need for men and women. Female friends more often give emotional support and intimacy to men than male friends do to women. This may explain why loneliness primarily affects the friendship choices of men. That self-esteem only affects women's choices is more difficult to explain. In the literature, it is assumed that unconventional friendships, such as between opposite-sex friends, require greater social skills. Perhaps access to men's networks is more difficult than access to women's networks and if such networks are more closed, outsiders will need more skills to enter them.

Which groups of hypotheses work best in explaining the development of opposite-sex friendships? This assessment cannot be made in general terms because it depends on whether one considers men or women. If we use the proportion of explained variance as a criterion, I can conclude that for women, opportunity structures have the biggest impact, followed by life-course variables and individual characteristics. For men, individual characteristics are most important, followed by life-course variables and opportunity structures. Although we have to be careful in making such claims, since they depend greatly on how well each concept is measured, it remains striking that the relative order of the importance of the three explanations is the opposite for men and women.

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Appendix: Panel Attrition

In the 1995 wave of the panel, 42 per cent of the respondents who participated in the first wave were still participating. The attrition is higher than usual in part because the spouse was also required to participate in the last wave. To correct for panel attrition, I apply Heckman's (1979) two-stage model of sample selection bias. I first estimated a probit regression model for the probability that respondents who were interviewed in 1987 were still in the sample in 1995. As identifying instruments for the selection equation, I use three variables, all measured in 1987: how much the respondent enjoyed the interview, the number of times the respondent did not answer an item in a series of 80 attitude questions (a measure of partial non-response), and whether the respondent would vote if elections were held. The probit selection equations, presented in Table A1, indicate that all three measures have the expected effects on panel attrition. The table further shows that people in more urbanized areas and less-educated people are more likely to drop out. In addition, people who report higher degrees of loneliness and people with more traditional sex-role attitudes are somewhat less likely to participate again. Life-cycle variables have weak effects on attrition. In the second step of the Heckman model, the predicted probability of staying in the sample was calculated and transformed into the Inverse Mills Ratio, which was then included in the substantive regression models of Tables 4 and 5. The results show that the so-called Inverse Mills Ratio has no significant effect on the percentage of opposite-sex friends and that the models with and without the correction are essentially the same (Tables 4 and 5). I therefore conclude that, even though attrition is selective to some extent, it does not affect my substantive findings.

Table A1. *Probit regression for the probability of being in the sample in 1995 given participation in 1987 on selected characteristics in 1987*

		Coeffcients		
	Range	All	Men	Women
Working for pay	0–1	0.191**	0.172 ~	0.193
Lower educated	0–1	−0.227**	−0.285*	−0.166
Degree of urbanization	0–1	−0.047**	−0.052**	0.045
Dating (versus single)	0–1	0.068	0.204 ~	−0.048
Married or cohabiting (vs. single)	0–1	0.155*	0.210 ~	0.113
Liberal sex-role attitudes (z-score)	−3.7–1.3	0.078*	0.070	0.072
Extraversion (z-score)	−2.7–2–2	−0.062 ~	−0.095 ~	−0.032
Self-esteem (z-score)	−3.8–1.7	−0.041	−0.033	−0.051
Loneliness (z-score)	−11.4–5.4	−0.067*	−0.003	−0.138**
Enjoyment of first interview	1–5	0.104*	0.130*	0.083
Number of missing answers on 80 attitude items	1–10	−0.067*	−0.074*	−0.068*
Intention not to vote at elections	0–1	−0.230**	−0.214 ~	−0.245*
Female (versus male)	0–1	−0.137*		
Constant		−0.317 ~	−0.434	−0.340
Likelihood ratio chi-square		87.2**	53.8**	41.3**
Proportion staying in the sample		0.420	0.430	0.410
Original number of respondents		1747	867	880

~$p < 0.10$; *$p < 0.05$; **$p < 0.01$ (two-tailed test).

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