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# Sexual Orientation, Prejudice, and Segregation

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This article examines whether gay and lesbian workers sort into tolerant occupations. With information on sexual orientation, prejudice, and occupational choice taken from Australian Twin Registers, we find that gays and lesbians shy away from prejudiced occupations. We show that our segregation results are largely driven by those gay and lesbian workers with disclosed identities and are robust to the inclusion of unobserved factors that are inherited and observed factors that strongly correlate with productive skills and vocational preferences. Our segregation estimates are consistent with prejudice-based theories of employer and employee discrimination against gay and lesbian workers.

## I. Introduction

In this article we examine how gay and lesbian workers fare in the labor market from a discrimination perspective laid out in Becker's 1957 book *The Economics of Discrimination*. Specifically, we focus on prejudice-

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based segregation and test whether gay and lesbian workers shy away from prejudiced occupations by estimating the relationship between sexual orientation, sexual prejudice, and occupational segregation. In addition, our empirical strategy takes into account some of the selectivity effects that typically hinder studies on discrimination against gays and lesbians: the observability of the workers' sexual orientation, the share of prejudiced workers at the workplace, and differences in productivity and vocational taste that may exist between gay, lesbian, and straight workers.

The data we use come from the Australian Twin Registers and contain detailed information on a large sample of identical and fraternal twins. In particular, we focus our attention on a 1992 sex survey in which twins were asked about their sexual orientation, the sexual orientation of their twin sibling, attitudes that touch on various aspects of homophobic sentiments, and the type of occupation in which they were employed.

The results indicate that gay and lesbian workers choose to work in less prejudiced occupations. In a series of estimations, we find that occupational segregation (*a*) is largely driven by those gay and lesbian workers with disclosed identities, (*b*) is not driven by unobserved factors that gay and lesbian workers share with their twin and observed factors that strongly relate to productive skills and vocational preferences, and (*c*) is comparable to segregation results generated from another more recent Australian data source. Our findings are consistent with those of Becker's model of employer and employee prejudice.

The remainder of this article proceeds as follows. Section II provides the background and motivation behind this study. Section III introduces our empirical strategy to estimate prejudice-based occupational segregation. Section IV briefly describes the Australian Twin Registers. Section V reports the main results on prejudice-based segregation driven by gay and lesbian workers sorting into tolerant occupations. Section VI reports the dual results on prejudice-based segregation driven by straight workers who do not want to work alongside gay and lesbian workers. Section VII discusses the internal and external validity of our twin findings through a replication exercise. Section VIII highlights the implications and conclusions of this study.

## II. Background and Motivation

Much of the empirical research on discrimination against gays and lesbians has concentrated on prejudice-based discrimination models taken from Becker's (1957) seminal work on labor market discrimination. In that book, Becker formalized how equally productive workers are treated differently because of differences in discriminatory tastes of, among others, employees and employers. In the case of gay and lesbian workers, for example, Becker's discrimination model would predict that in (the short-run)

equilibrium, prejudice leads certainly to segregation and possibly to earnings differentials, where gay and lesbian workers end up earning less than heterosexual workers.

These prejudice predictions have a strong intuitive appeal. If employees are prejudiced and demand compensation to work alongside gay and lesbian workers, unprejudiced and optimizing employers will find it too expensive to simultaneously hire gay, lesbian, and prejudiced straight workers, which in equilibrium leads to segregation. And similarly, if employers are prejudiced and perceive gay and lesbian workers as more expensive than they actually are, gays and lesbians will face the incentive to sort away from prejudiced employers and look for work at unprejudiced (or less prejudiced) employers. In equilibrium there is again market segregation in which equilibrium wages of gay and lesbian workers are set by those employers that hire them. Market segregation occurs with earnings discrimination if there are not enough unprejudiced employers to hire all gay and lesbian workers. Since the gay and lesbian workforce is fairly small, it is not clear whether we should observe earnings discrimination against gay and lesbian workers.<sup>1</sup>

In the long run, it is not clear whether prejudice models of employer discrimination can explain segregation and differences in earnings. Some have argued that employer prejudice cannot be held accountable for any labor market differences because discriminating employers cannot survive in a competitive labor market (Arrow 1973). Others have argued that prejudice may survive and cause structural segregation and differences in earnings because discriminating employers operate under market imperfections, because employers do not discriminate against gay and lesbian workers but discriminate in favor of straight workers, and because discriminating employers who go bankrupt under perfect competition return to the labor market as discriminating employees (Goldberg 1982; Black 1995; Charles and Guryan 2008).

Researchers have attempted to test these prejudice predictions by comparing the labor market earnings and occupational choices of gay, lesbian, and heterosexual workers. Evidence of this kind appears ambiguous (at best). On one hand, the empirical studies on earnings differentials between gay and heterosexual men typically find that gay workers earn less than

<sup>1</sup> In the Becker model, minority workers are exposed to the discriminatory tastes of majority employers and employees. This does not imply that minority workers do not discriminate. If minority employers and employees discriminate against prejudiced majority workers, their tastes will likely lead to segregation between prejudiced minority workers and prejudiced majority workers. We do not expect, however, that discriminatory tastes of minority employers and employees will cause any observable difference in earnings between prejudiced and unprejudiced majority workers because there are too few gay and lesbian employers.

heterosexual workers, which is consistent with Becker's prejudice model of labor market discrimination (Badgett 1995; Klawitter and Flatt 1998; Clain and Leppel 2001; Berg and Lien 2002; Black et al. 2003; Blandford 2003; Plug and Berkhout 2004, 2008; Frank 2006; Carpenter 2007; Elmsie and Tebaldi 2007; Ahmed and Hammarstedt 2010). On the other hand, results taken from similar earnings studies on lesbian and heterosexual women often indicate that lesbian workers earn more, and not less, than other female workers, which goes against prejudice-based models of discrimination (Klawitter and Flatt 1998; Clain and Leppel 2001; Berg and Lien 2002; Black et al. 2003; Blandford 2003; Plug and Berkhout 2004; Arabsheibani, Marin, and Wadsworth 2005; Elmsie and Tebaldi 2007; Ahmed and Hammarstedt 2010).<sup>2</sup>

Most of these studies recognize that occupational choice may play an important part in explaining the wage differentials between gay, lesbian, and straight workers. The estimated wage penalties and premia for gay and lesbian workers, however, do not change much when occupational choices are taken into account. To a lesser degree, researchers have looked at the relationship between sexual orientation and occupational segregation directly. These segregation studies generally find comparable results. That is, gay men are more likely to work in lower-ranked, more female-oriented occupations than other men, whereas lesbian women are more likely to work in higher-ranked, less female-oriented occupations than other women (Frank 2006; Black, Sanders, and Taylor 2007; Elmsie and Tebaldi 2007; Antecol, Jong, and Steinberger 2008).

Of course, there are serious concerns that findings based on simple comparisons may not accurately reflect the sexual prejudices held by employers and employees; among these are possible productivity and taste differences between gay, lesbian, and straight workers; the difficulty to observe and measure the discriminatory intentions of employers and employees; the option gay and lesbian workers have to hide their identity; and the extent to which occupational segregation is informative about workplace segregation. We will discuss each of these concerns in turn.

The first difficulty in detecting prejudice-based segregation is that unobservable productivity and taste factors that affect the labor market decisions of workers may also be correlated with the workers' sexual orientation. In fact, there are strong theoretical reasons to believe that such omitted factors exist and drive the labor market outcomes as observed among gay and lesbian workers (Becker 1981). Since many gays and lesbians have no children and are less likely to gain from specialization, leading models of household specialization predict that gays are more likely to work in more female-oriented, lower-paid occupations and, conversely,

<sup>2</sup> A notable exception is the empirical study of Carpenter (2008), who finds among a sample of young women in Australia that lesbians earn less.

that lesbians are more likely to work in more male-oriented, higher-paid occupations.<sup>3</sup>

The second difficulty is that tests of prejudice models typically ignore direct measures of discriminatory attitudes. Without information on discriminatory intentions of employers and employees, however, it is theoretically possible to attribute any observed difference in occupational outcomes of lesbian, gay, and straight workers to sexual prejudices held by employers and employees. So if, for example, discrimination by men against gays is more pervasive than discrimination by men against lesbians, and there are some reasons to believe that this is the case (Raja and Stokes 1998; Herek 2000), we may consequently find that only gays are discriminated against and end up working in more female-oriented occupations with lower market earnings.

The third difficulty we consider is that prejudice tests should recognize that a worker's sexual orientation is not always apparent to employers and employees. Some gay and lesbian workers may fear the consequences of a discriminating labor market and hide their sexual orientation from their employer and fellow employees. If the workers' sexual orientation is known to us researchers but unknown to some employers, self-reported data on sexual orientation may not always be the relevant margin on which prejudiced employers and employees discriminate. Instead a variable measuring the extent of workplace disclosure would be more appropriate to test Becker's prejudice predictions (Badgett 1995; Plug and Berkhout 2008).

The fourth and final difficulty is that most empirical work focuses on occupational segregation. In practice, workers interact with each other in the workplace and not in occupations, and (because of that) estimates of occupational segregation between gay, lesbian, and straight workers may conceal the true level of segregation. Measures of occupational segregation, for example, miss out on those gay, lesbian, and straight workers with similar occupations who work in different workplaces.

Our empirical strategy overcomes at least some of the difficulties of earlier discrimination studies on sexual orientation and occupational choice. First, our statistical models include twin fixed effects and therefore control for all observed and unobserved characteristics that twins share. To the

<sup>3</sup> In light of this difficulty, there have been some recent field experiments that estimate the effect of sexual orientation on hiring probabilities using correspondence test data (Weichselbaumer 2003; Drydakis 2009). The idea is to send out multiple fake resumes to real position ads and measure corresponding callback rates. Sexual orientation is identified by means of a randomized resume entry on volunteering for the local gay and lesbian community. While these studies find some evidence of labor market discrimination against gay and lesbian applicants, they do not prove that it is prejudice driven. In line with the omitted factors argument, if some employers expect the productive skills among gay, lesbian, and heterosexual workers to differ, correspondence experiments cannot make a distinction between prejudice-based and information-based discrimination models.

extent that twins with different orientations are identical in all their occupational preferences and productive skills, our estimated sexual orientation effects identify prejudice-based segregation. Second, we use self-reported measures of prejudicial attitudes at the occupational level to explore Becker's prediction that gays and lesbians sort into less prejudiced occupations. Third, we collected multiple measures of sexual orientation by asking twins to report on their own and their twin's sexual orientation. If the sibling report is positively related to workplace disclosure, we can estimate the impact of sexual orientation on occupational choice within a disclosure framework and assess the role of disclosure in our estimates of prejudice-based segregation. Fourth, we assess segregation at the occupational level. With the data at hand, there is little we can do about estimating segregation at the workplace. What we can do is bound our estimates: if we find any evidence of segregation caused by prejudice at the occupational level, our estimates can be treated as lower bounds suggesting higher levels of prejudice-based segregation at the workplace level.

Economists rarely make use of subjective attitude questions on prejudice. Much of the neglect, we believe, can be attributed to limited data availability and a general distrust. Information on prejudice in combination with labor market outcomes is rarely collected. Moreover, information on prejudice is possibly misleading. If people systematically underreport their prejudice, which goes under the name of social response bias, we would be more inclined to wrongfully dismiss prejudice-based discrimination as one of the causes of the observed wage differentials among gay, lesbian, and straight workers. This does not mean, however, that it is impossible to obtain meaningful estimates from misleading prejudice measures. In our case, for example, we can still detect prejudice-based segregation with systematic underreporting if we assume rank-order stability across tolerant and intolerant occupations.

There are a handful of studies that recognize the advantages of using data on prejudice attitudes, and they have begun to examine the relationship between racial prejudice, residential segregation, and earnings directly (Cutler, Glaeser, and Vigdor 1999; Dustmann and Preston 2001; Card, Mas, and Rothstein 2008; Charles and Guryan 2008). As far as we know, there are two sexual prejudice studies related to the approach we take in this article. Black et al. (2002) focus on residential segregation and investigate whether the location choice of gay and lesbian couples (taken from the 1990 census) depends on the fraction of gay-unfriendly citizens (taken from antigay attitude questions in the General Social Survey). At the cross-sectional level of large metropolitan areas, they find that prejudicial attitudes do not play a role in the location decisions of gays and lesbians. Badgett and King (1997) focus, as we do, on occupational segregation and use information on sexual orientation, occupation, and antigay attitudes from the General Social Survey. With fractions of gay, lesbian, and unprejudiced workers measured in five broadly

defined occupational categories, they find that gay workers tend to work in more tolerant occupations, whereas lesbian workers seem to concentrate in less tolerant occupations. Badgett and King acknowledge, however, that their analysis is merely descriptive and that the combination of more specifically defined occupations with more sophisticated statistical strategies would help them to better understand how gay, lesbian, and straight workers are distributed among different occupations. This is exactly what we set out to do in this article. In a related fashion, we analyze how gay and lesbian workers choose their occupations. That is, we assess self-reported measures of sexual intolerance to test whether the labor market segregates gay and lesbian workers from prejudiced workers. In view of the sparse literature, we consider it useful to have more than one study using comparable methodologies with different data. In addition, we complement the work of Badgett and King in at least two other directions, of which we have already made mention.

### III. Modeling Prejudice-Based Segregation

In this section, we formally define prejudice-based segregation, introduce a methodological framework to arrive at regression equations, and propose our empirical strategy to test directly for prejudice-based segregation.

#### A. Theoretical Framework

We define prejudice-based segregation to occur when gay and lesbian workers are less likely to choose to work in occupations in which they expect to experience sexual intolerance. We model occupational choice akin to a standard selection model in which workers (including gay, lesbian, and straight workers) can choose one of two possible occupations: intolerant occupation and tolerant occupation. Workers get utility from working and choose to work in that occupation with the highest utility. We model prejudice-based segregation via the intolerant occupation, where exposure to the discriminatory tastes of employers and fellow workers causes disutility to gay and lesbian workers.

Let us start with defining the following variables:  $V^D$  and  $V^{ND}$  represent the utility the workers get from being employed in either intolerant or tolerant occupations,  $X$  and  $U$  represent the observable and unobservable productivity and occupational taste factors, and  $H$  denotes the workers' sexual orientation and equals one for gay and lesbian workers and zero otherwise. If we specify utility by occupation to consist of observable and unobservable factors and assume that the same attributes may affect utility differently in the two occupations, we may write

$$V_i^D = \alpha^D H_i + \beta^D X_i + \gamma^D U_i + \epsilon_i^D \quad (1)$$

and



$$V_i^{ND} = \beta^{ND} X_i + \gamma^{ND} U_i + \epsilon_i^{ND}, \quad (2)$$

where  $i$  indicates workers, and  $\epsilon^D$  and  $\epsilon^{ND}$  represent the stochastic error terms (which are uncorrelated with each other and with  $X_i$  and  $U_i$ ). If we further assume that  $X$  and  $U$  fully determine the workers' main occupation, then prejudice-based segregation occurs with a negative  $\alpha^D$ . The reduced form of this model is obtained by taking the difference between (1) and (2), that is,

$$v_i^D = \alpha H_i + \beta X_i + \gamma U_i + \epsilon_i, \quad (3)$$

where a higher  $v^D$  signals that workers are more likely to choose to work in intolerant occupations, and a negative  $\alpha$  indicates prejudice-based segregation. This result captures the spirit of Becker's segregation model: gay and lesbian workers get disutility from contact with discriminatory employers and fellow workers and therefore face the incentive to sort into more tolerant occupations.<sup>4</sup>

## B. Empirical Framework

A test for prejudice-based segregation requires prior determination of tolerant and intolerant occupations. In our empirical model, we take the observed fraction of prejudiced straight workers by occupation as the relevant measure of intolerance  $F^D$  and let it depend on observable and unobservable productivity and taste factors,

$$F_{ijk}^D = \alpha_1 H_{ij} + \beta_1 X_{ij} + \gamma_1 U_{ij} + \epsilon_{ijk}, \quad (4)$$

where indices  $i$ ,  $j$ , and  $k$  stand for worker  $i$  born in family  $j$  working in occupation  $k$ . The remaining error  $\epsilon$  is uncorrelated with the unobserved components in  $U$ . Prejudice-based segregation is identified (by means of a negative  $\alpha_1$ ) if we assume either that all relevant productive skills and occupational tastes are related to variables we observe and control for or that unobserved productivity and taste factors are not related to the workers' sexual orientation. In practice, however, these assumptions seem implausible.

We next consider whether we can identify  $\alpha_1$  if the worker is an identical twin and we have information for each twin pair on their sexual orientation and main occupation. If we suppress subscripts for notational convenience and take the difference of equation (4) across workers who are identical twins, we get

$$\Delta F^D = \alpha_1 \Delta H + \beta_1 \Delta X + \gamma_1 \Delta U + \Delta \epsilon. \quad (5)$$

<sup>4</sup> It is possible to reformulate Becker's theory on prejudice-based discrimination (with identical segregation predictions) in terms of utility gains in tolerant occupations, where gay and lesbian workers get positive utility from contact with nondiscriminatory employers and fellow workers. This will lead to a reduced-form model identical to the one we present in eq. (3).

Prejudice-based segregation is now identified if we assume that identical twins, albeit different in orientation, are identical in their unobservable productivity and taste factors (or  $\Delta U = 0$ ).

While it seems plausible to impose similarity in productivity and taste factors among identical twins with similar genetic makeup and family background, not everyone is convinced that twin fixed-effect estimation will give us unbiased estimates of prejudice-based segregation. There are two main concerns: (a) there may be classification error in sexual orientation measures, and (b) the twins we use to identify prejudice-based segregation are very similar but not identical. In what follows, we discuss each concern in more detail and explore possible routes to deal with these concerns.

### C. Measurement Error

One of the fundamental problems that has received much attention in twin studies is measurement error. In our empirical analysis, in particular, we should be concerned about measurement error for two reasons. First, information on sensitive issues such as the sexual orientation of twins may be more prone to measurement error. Second, measurement error in the case of misclassified binary variables such as sexual orientation will never lead to classical measurement error, for which standard twin solutions are available (Ashenfelter and Krueger 1994). Instead, we follow Black, Berger, and Scott (2000), who offer solutions to bound the parameter of interest if there are two noisy measures of the same binary variable. In our data we measure the respondent's sexual orientation twice: respondents are asked to report on their own and their twin's sexual orientation. We combine these potentially noisy reports to construct lower and upper bounds on the sexual orientation effect, as in Black et al. (2000).<sup>5</sup>

### D. Sexual Orientation Differences among Identical Twins

The other problem we face is that identical twins with different sexual orientations may also be different in other characteristics. In particular, we think of twin differences in characteristics that determine the choice of occupation, such as productive skills and occupational tastes. While prejudice-based segregation can still be identified if we assume that those unobservable twin differences in productivity and taste factors are either small or unrelated to observable twin differences in sexual orientation, there is little empirical work documenting the extent to which twin differences in sexual orientation are exogenously determined. To get some indication about the importance of unobserved heterogeneity within twin pairs, we discuss how possible con-

<sup>5</sup> This particular strategy to correct for measurement error is conceptually similar to the strategy we propose to test for disclosure effects; i.e., Black et al. (2000) would interpret similarity in twin reports as an accuracy measure of sexual orientation, whereas we interpret similarity in twin reports as a measure of disclosure.

founding causes and consequences of sexual orientation may lead to biased twin estimates.

We start with confounding causes; that is, there may be innate differences between gays, lesbians, and heterosexuals that also drive some of the differences in skills and occupational preferences. Dawood, Bailey, and Martin (2009) have recently summarized those twin studies that estimate the heritability of sexual orientation by comparing similarity in sexual orientation among monozygotic and dizygotic twin pairs. The two most common findings are that monozygotic twins often differ in their sexual orientation but that monozygotic twins (who share all genes) differ less in their sexual orientation than dizygotic twins (who share some, but not all, genes). They therefore conclude that sexual orientation must have genetic and environmental origins. In equation (4) it is easy to see that the influence of genetic and environmental factors that monozygotic twins share is eliminated by differencing. Environmental factors that are not shared, however, are still there and need to be taken into account. Dawood et al. report that these nonshared environmental factors explain about 30%–70% of all the variation in sexual orientation. What it is that is causing these environmental differences among monozygotic twins is still unresolved. Among the early childhood causes, prenatal variation in hormonal intake and epigenetic variation in the on/off switching of genes have been mentioned for within-twin pair sexual orientation differences (Bogaert 2006; Oates et al. 2006). To the extent that these prenatal hormonal and epigenetic differences also lead to differences in productivity and occupational preferences, it is possible that our estimates of prejudice-based segregation are biased.

We next turn to confounding consequences; that is, there may be differences in skills and occupational preferences that are driven by differences in sexual orientation. There are a number of candidate consequences that are more commonly observed among gays and lesbians; among these are the absence of children and fashionable urban location (Black et al. 2002). First, gays and lesbians generally express a much lower demand for children. If gays and lesbians do not have to (or are less likely to) bear the financial and emotional responsibilities of having children, it is not unlikely that they choose to work in other occupations, where other occupations take the form of less financially driven occupations for gays and more career-driven occupations for lesbians. Second, gays and lesbians are often located in high-amenity cities. If high-amenity cities are also more tolerant cities, it is possible that gays and lesbians work in more tolerant occupations not because of occupational choice but because of locational choice.<sup>6</sup> To the extent that occupational choices are tied to childbearing and location, the sexual orientation effect as estimated in (5) may capture not only the impact of prejudice-

<sup>6</sup> Black et al. (2002) focus on residential segregation in the United States and find that prejudicial attitudes do not matter in the location decisions of gay and lesbian couples.

based segregation but also the way in which decisions regarding children (or absence of children) and where to live affect the occupational choice of gay and lesbian workers.

Although confounding causes and consequences could both lead to biased occupation segregation estimates, we are most concerned about confounding consequences. The argument is fairly simple. With twins we can reduce the impact of confounding causes, in particular, if we assume that sexual orientation falls along a continuum and identification comes from twins who are both on the margin and thus are more similar to begin with. With twins, however, we cannot do much about the impact of confounding consequences. Confounding consequences, such as fertility and locational choices, are themselves outcome variables that result from twin differences in sexual orientation and should be treated as such.<sup>7</sup>

In an attempt to assess the empirical importance of unobserved heterogeneity within twin pairs, we follow Sandewall, Cesarini, and Johannesson (2009) and test how our estimates change when we take account of possible confounding causes. With measures that arguably correlate with productive skills and occupational tastes, we perform two tests. The first test checks how much of the variation in occupational choice due to observable skill and taste measures changes when we include twin fixed effects. A substantial fall would imply that much of the variation in observable skills and occupational tastes is indeed shared among twin pairs. The second test checks how the fixed-effects estimates of sexual orientation on workplace intolerance change when we include skill and taste measures. Small changes would indicate a marginal role of observed and unobserved skill and taste factors.

#### IV. Data

The data used in this study started with a mail health and lifetime survey undertaken between 1988 and 1990 among twins enrolled in the Australian National Health and Medical Research Council Twin Registry (ATR). Joining the registry and responding to the survey were both voluntary. In 1992 those responding twins between ages 17 and 50 were contacted and asked about their willingness to receive a questionnaire regarding sex.<sup>8</sup> Of the 9,112 twins who were contacted, 6,561 said yes and 4,903 of them returned the questionnaire.

As our main data source we use the 1992 sex survey. We focus our attention on those variables that are most relevant to an empirical analysis of

<sup>7</sup> To test how seriously these confounding consequences interfere with the occupational decisions of gays and lesbians, one would need information on either the number of children or the choice of location. The sex survey does not collect this information. Hence, direct testing is not possible.

<sup>8</sup> Specifically, they were asked the following question: "We have applied for funding to carry out an *anonymous* study of sexual behavior and attitudes. Would you be willing to receive a questionnaire with explicit questions on these topics?"

sexual orientation, sexual prejudice, and occupational segregation. We discuss each variable in turn and report nonresponse rates for those sex questions we consider sensitive.

First, the questionnaire collected information on sexual orientation. Twins were asked whether they consider themselves as heterosexual (straight), bisexual, gay, or lesbian. Those twins who reported being gay, lesbian, or bisexual are recoded such that they form one minority group. Of the 4,834 twins who responded to the sexual orientation question, we find that 215 of them were gay, lesbian, or bisexual.<sup>9</sup>

Second, the sex questionnaire gathered implicit information on workplace disclosure. Twins were asked not only about their own sexual orientation but also about the sexual orientation of their twin sibling. We are therefore able to construct two measures for each twin's sexual orientation: one taken from the report of the twin and the other one taken from the report by the respondent's twin on the respondent's sexual orientation. The appendix contains the exact phrasing of the sexual orientation questions. In much of our analysis we will interpret the degree of concordance between both measures within a disclosure framework and assume that sexual minorities who came out to their twin siblings were also more likely to come out to their employers and fellow workers. The question in which twins were asked about their twin siblings' sexual orientation led to some nonresponse. There are 3,636 twins for whom we have two sexual orientation measures. Of these 3,636 twins, 147 twins indicated that they were gay, lesbian, or bisexual, of whom 57 had siblings who know their sexual orientation.<sup>10</sup>

Third, the questionnaire included a set of attitude questions that touch on various aspects of homophobic sentiments. That is, twins were confronted with 10 different sexual prejudice statements and were asked to answer yes if they agreed with the statement but answer no if they disagreed. Statements were phrased within negative (discriminatory) and positive (nondiscriminatory) contexts and therefore varied in response format. A list of the sexual prejudice statements, together with a summary of the responses, are provided in table 1. Assuming that respondents without homophobic sen-

<sup>9</sup> In our empirical analysis, we pool gay, lesbian, and bisexual workers to form sexual minority samples that are large enough to conduct sensible statistical analysis. In our discussions, however, we will mostly refer to gay and lesbian workers as sexual minority workers.

<sup>10</sup> Our sibling disclosure rate of 40% appears low compared to previous estimates. Bell and Weinberg (1978), e.g., report that about 50% of gays and about 70% of lesbians have told their siblings about their homosexuality. This does not mean that disclosure patterns among gay, lesbian, and bisexual twins in the ATR are necessarily different. Our disclosure estimate includes bisexual respondents, who are more easily perceived as straight. If we restrict our sample to gay and lesbian respondents, as Bell and Weinberg do, our two sexual orientation measures indicate that about 80% come out to their sibling.

**Table 1**  
**Variables Used to Measure Sexual Prejudice in the Australian Twin Registry**

Description	Agree	Not Agree
Homosexuality is merely a different kind of sexuality and is not immoral		.399
Homosexual men should be allowed to work in the following professions:		
Schoolteachers		.362
Court judges		.260
Ministers		.356
Medical doctors		.338
Government officials		.219
Homosexuals are dangerous as teachers or youth leaders because they try to get sexually involved with children	.255	
Homosexuality is obscene and vulgar	.368	
Homosexuality is a social corruption and can cause the downfall of civilization	.235	
Homosexuals should be allowed to dance with each other in public places		.406

NOTE.—In total, 4,903 respondents were asked to answer yes if they agreed with the statement but answer no if they disagreed. We use these answers to construct a sexual prejudice index. In the case of the positive statements (i.e., homosexuals should be allowed to dance with each other in public places), we sum the no answers. In the case of the negative statements (i.e., homosexuality is obscene and vulgar), we sum the yes answers. The prejudice index is the total score divided by the total number of responses. A prejudiced worker is defined as a worker with a positive index (i.e., a worker with at least one prejudiced response).

timents always answered in a nondiscriminatory way, we define twin respondents as prejudiced respondents when they answered no to one of the positive statements (i.e., homosexuals should be allowed to dance with each other in public places) or yes to one of the negative statements (i.e., homosexuality is obscene and vulgar).<sup>11</sup> At the outset we were concerned that many respondents would refuse to respond to questions involving homophobic sentiments. This is not the case. We are able to create a prejudice indicator for almost all twins. If we need at least two complete answers to 10 separate statements to construct the prejudice indicator, we miss out on only 15 twins.

Fourth, the sex survey collected labor market information on the twins' occupation. Answers were transformed according to the Australian Standard Classification of Occupations (1st ed.). In anticipation of selective nonresponse because women do not always work during their working lives, twins were asked about their usual and regular lifetime occupation rather than the occupation held in the year prior to the survey. There were 3,789 twins who answered the lifetime occupation question.

<sup>11</sup> In our empirical analysis, we will test the robustness of our results to different measures of prejudice.

Finally, the questionnaire also collected information on schooling and personality, which are two other explanatory variables that we will use in our analysis. Schooling was measured in seven categories and equaled the number of years nominally required for the highest level of schooling the twin completed. Personality traits were taken from the Revised Eysenck Personality Questionnaire (REPQ), which has been designed to measure various personality dimensions in surveys using relatively short test instruments (Eysenck, Eysenck, and Barrett 1985). We selected extraversion and neuroticism, which are those personality traits the REPQ shares with the more common five-factor model of personality structure (Digman 1990; Goldberg 1990). The two traits extraversion and neuroticism were assessed by 12 items each. Items were statements such as "Are you a talkative person?" or "Does your mood often go up or down?" Individuals could answer either yes or no. The single item responses are then coded into average scores. Average scores require at least one complete answer to the question sets that correspond to each personality trait. We could not measure personality for 14 twins.

One of the key dependent variables in our analysis is the concentration of prejudiced workers who were straight calculated for each occupation in which twin respondents were employed. To create this variable we exploit the cross-sectional structure of the ATR and focus on those twins for whom we have complete information on occupation, prejudicial attitude, and sexual orientation. The occupations we consider are two-digit occupational groups with more than 10 workers. Within each occupation we concentrate on straight workers only. We first calculate the share of male and female workers who were prejudiced and straight and then compute weighted prejudice averages using representative occupation shares of male and female workers taken from the 1986 Census of Population and Housing. By the same token, we generate the concentration of sexual minority workers by occupation. We compute worker shares of gay and bisexual male workers and of lesbian and bisexual female workers and then take a weighted occupation average. The twin sample we use to create these sexual prejudice and minority concentration variables consists of 3,730 workers, of whom 158 were gay, lesbian, or bisexual. Of the 3,572 straight workers, 2,473 responded in a discriminatory way and are defined as sexually prejudiced.

In our empirical analysis, however, we exploit the twin structure of the ATR and focus on twin pairs and the differences between them. We therefore select those twin pairs for which we have complete information on occupation, sexual prejudice, their own and twin sibling's sexual orientation, schooling, and personality (measured by at least two complete answers to the separate items that correspond to each personality trait). The number of twin pairs who returned the sex survey equals 1,908. But in the main empirical analysis, we work with a subsample of 1,071 pairs of twins (of which 572 pairs are pairs of identical twins); the reduction in sample size is largely due to in-

**Table 2**  
**Means and Standard Deviations of Selected Variables in the**  
**Australian Twin Registry**

	Identical Twins	All Twins	Heterosexual		Homosexual	
			Males	Females	Gays	Lesbians
Sexual orientation:						
Worker is gay or lesbian, self-reported	.031	.035	.000	.000	1.000	1.000
Worker is gay or lesbian, sibling-reported	.015	.014	.001	.001	.432	.324
Concordant pairs	.951	.942	.962	.974	.081	.243
Sexual prejudice:						
Worker with at least one prejudiced response	.636	.655	.775	.607	.324	.243
Concordant pairs	.685	.670	.718	.645	.675	.567
Individual characteristics:						
Female	.678	.635	.000	1.000	.000	1.000
Age	31.834 (8.206)	31.376 (7.985)	31.977 (8.067)	31.050 (7.921)	31.351 (8.360)	30.972 (7.794)
Years of schooling	12.550 (2.322)	12.498 (2.274)	12.845 (2.264)	12.278 (2.249)	13.148 (2.516)	12.729 (2.123)
Neuroticism	.395 (.265)	.407 (.269)	.332 (.264)	.445 (.263)	.516 (.252)	.418 (.288)
Extraversion	.634 (.296)	.626 (.300)	.621 (.298)	.628 (.300)	.632 (.303)	.643 (.292)
Occupation characteristics:						
% prejudiced workers	.695 (.117)	.702 (.122)	.746 (.141)	.677 (.100)	.717 (.132)	.640 (.101)
% sexual minority workers	.048 (.032)	.049 (.033)	.046 (.037)	.049 (.030)	.076 (.043)	.054 (.023)
Managerial	.078	.077	.127	.046	.162	.054
Professionals	.300	.288	.347	.253	.243	.324
Paraprofessionals	.122	.124	.088	.141	.135	.189
Trades and services	.086	.100	.212	.037	.162	.027
Clerical	.265	.250	.079	.349	.189	.216
Sales	.100	.105	.067	.127	.054	.081
Laborer	.050	.056	.077	.045	.054	.108
Observations	1,144	2,142	745	1,323	37	37

NOTE.—Standard deviations are in parentheses.

complete occupational records and incomplete records on the twin report about the twin sibling's sexual orientation. Table 2 presents summary statistics for the main variables we study below.

## V. Main Results

Before presenting our empirical estimates, we look at occupations in which prejudiced workers and gay and lesbian workers end up working, along with the total number of twins working across the two-digit occupations. In column 1 of table 3, we see that the majority of the straight workforce responds



**Table 3**  
**Sexual Prejudice and Sexual Orientation across Occupations**

Occupation	% Prejudiced	% Minority	N
Entire sample	.761	.055	3,730
Managerial:			
General managers	.751 (24)	.093 (43)	20
Specialist managers	.623 (12)	.083 (40)	60
Farmers and farm managers	.839 (32)	.022 (14)	95
Managing supervisors (sales and service)	.643 (13)	.078 (37)	95
Managing supervisors (other)	.806 (30)	.042 (26)	27
Professionals	.541 (5)	.054 (29)	21
Natural scientists	.610 (11)	.055 (31)	55
Building professional and engineers	.676 (14)	0 (1)	70
Health diagnostics and treatment practitioners	.515 (3)	.052 (28)	115
Schoolteachers	.602 (10)	.037 (23)	401
Other teachers and instructors	.532 (4)	.167 (51)	18
Social professionals	.600 (8)	.153 (50)	51
Business professionals	.676 (15)	.031 (20)	159
Artists and related professionals	.468 (2)	.071 (34)	78
Miscellaneous professionals	.438 (1)	.032 (22)	46
Paraprofessionals	.824 (31)	.153 (49)	14
Medical and science technical officers	.587 (6)	0 (1)	26
Electrical and electrical engineering	.891 (41)	0 (1)	28
Registered nurses	.589 (7)	.066 (32)	282
Police	.930 (45)	.018 (13)	32
Welfare paraprofessionals	.747 (23)	.148 (48)	60
Trades and services:			
Metal fitting and machining tradespersons	.922 (44)	0 (1)	38
Other metal tradespersons	.912 (43)	.006 (8)	36
Electrical and electronics tradespersons	.871 (35)	.016 (12)	63
Building tradespersons	.986 (50)	.027 (18)	73
Printing tradespersons	.946 (47)	0 (1)	11
Vehicle tradespersons	.968 (49)	.031 (21)	32
Food tradespersons	.890 (40)	.097 (44)	55
Amenity horticultural tradespersons	.956 (48)	.079 (38)	24
Miscellaneous tradespersons	.862 (34)	.027 (17)	83
Clerical:			
Clerks	.732 (22)	.054 (30)	499
Stenographers and typists	.703 (17)	.009 (10)	215
Data processing and business machine operators	.712 (18)	.026 (16)	39
Numerical clerks	.755 (25)	.072 (35)	59
Receptionists, telephonists, and messengers	.770 (27)	.014 (11)	62
Collection clerks	.872 (36)	.142 (47)	12
Sales:			
Salespersons and personal service workers	.776 (29)	.041 (24)	44
Investment, insurance, and real estate salespersons	.895 (42)	.041 (25)	26
Sales representatives	.874 (37)	.138 (46)	16
Sales assistants	.770 (28)	.080 (39)	152
Tellers, cashiers, and ticket salespersons	.856 (33)	0 (1)	13
Miscellaneous salespersons	.698 (16)	.091 (42)	60
Personal services workers	.601 (9)	.008 (9)	116

Table 3 (Continued)

Occupation	% Prejudiced	% Minority	<i>N</i>
Machinery operators and drivers:			
Road and rail transport drivers	.727 (21)	.044 (27)	33
Mobile plant operators (except transport)	1 (51)	0 (1)	11
Machine operators	.767 (26)	.119 (45)	18
Laborers and related workers	.875 (38)	.028 (19)	38
Trades assistants and factory hands	.930 (46)	.083 (41)	54
Agricultural laborers and related workers	.875 (39)	.023 (15)	17
Cleaners	.713 (19)	.076 (36)	27
Miscellaneous laborers	.719 (20)	.070 (33)	51

NOTE.—The top row reports and ranks (in parentheses) shares of prejudiced straight workers and shares of sexual minority workers. Prejudiced workers include all workers with a positive prejudice index (i.e., workers with at least one prejudiced response). Sexual minority workers include all gay, lesbian, and bisexual workers. Shares are calculated using information on 3,730 workers in the ATR. For occupation information we rely on the Australian Standard Classification of Occupations (first ed.) of the Australian Bureau of Statistics using occupation definitions at the two-digit level. Within each occupation we first calculate the share of male and female workers who are prejudiced and straight and then compute weighted prejudice averages using representative occupation shares of male and female full-time workers taken from the 1986 Census of Population and Housing. Occupational cells with fewer than 10 observations are excluded.

to the prejudice questions in a prejudiced way. When we define a prejudiced worker as a worker with at least one prejudiced response and concentrate on our sample of straight twins only, we find that about 75% are prejudiced. There is substantial variation in prejudicial attitudes across occupations, where prejudice patterns accord reasonably well with common perceptions of sexually tolerant and intolerant occupations. In the least prejudiced occupations—the five most tolerant occupations can be found among professionals, including librarians, artists, medical practitioners, and teachers—about 50% of the straight workers are classified as prejudiced. In the most prejudiced occupations—the five most intolerant occupations can be found among plant operators and tradespeople, including carpenters, motor mechanics, printing machinists, and gardeners—more than 95% of the workers are uncomfortable with homosexuality. In column 2, we see that about 5% of the workers are gay or lesbian. Although the sample size is small—we work with 158 gay and lesbian workers across 51 different occupations—we find that gay and lesbian workers tend to work in more tolerant occupations. The raw correlation between the fraction of prejudiced workers and the fraction of gay and lesbian workers is  $-.204$ , and the raw correlation between the prejudice ranking and sexual minority ranking is  $-.173$ . These numbers indicate that there is labor market segregation and that gays and lesbians sort into less prejudiced occupations. These numbers, however, represent associations and do not necessarily ensure that occupational segregation is prejudice driven.

#### A. Occupational Choice of Gay and Lesbian Workers

To quantify more precisely the extent to which occupational segregation is prejudice driven, we estimate a variety of regression models set out in equations (4) and (5). Table 4 reports these results. We begin with the estimates in panel A, which are based on a sample of identical twins. In column 1 we

**Table 4**  
**Estimating the Relationship between Occupational Prejudice and Sexual Orientation**

	Least Squares			Least Squares/ Instrumental Variables			Fixed Effects			Fixed Effects/ Instrumental Variables		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
A. Identical twins:												
Worker is gay or lesbian		-.038 (.019)**	-.026 (.020)		-.086 (.037)**	-.070 (.043)	-.067 (.021)**	-.053 (.021)**			-.065 (.036)*	-.047 (.035)
Worker is gay or lesbian (other twin agrees)			-.065 (.032)**	-.054 (.038)					-.081 (.034)**	-.071 (.034)**		
Worker is gay or lesbian (other twin disagrees)			-.019 (.023)	-.006 (.020)					-.059 (.026)**	-.043 (.026)**		
Observations	1,144						572					
Minority observations	36						28					

B. Identical and fraternal twins:										
Worker is gay or lesbian	-.034 (.014)**	-.025 (.014)*	-.059 (.023)***	-.049 (.027)*	-.049 (.016)***	-.034 (.016)**	-.051 (.026)*	-.040 (.025)	-.076 (.027)***	-.054 (.027)**
Worker is gay or lesbian (other twin agrees)		-.050 (.020)**	-.046 (.023)**							
Worker is gay or lesbian (other twin disagrees)		-.024 (.019)	-.013 (.017)				-.049 (.020)**	-.030 (.020)		
Observations	2,142			1,071						
Minority observations	74			62						
Schooling and personality trait controls included										
		X		X		X		X		X
<i>F</i> -tests for joint significance:										
Identical twins		99.78***	100.57***			5.02***		5.07***		
All twins		210.73***	211.40***			24.40***		24.41***		

NOTE.—The dependent variable is the fraction of prejudiced workers amid straight workers, measured in two-digit occupations. The independent variable of interest is sexual orientation and variations thereof. In cols. 1, 2, 7, and 8, sexual orientation is self-reported sexual minority. In cols. 3, 4, 9, and 10, sexual orientation is self-reported sexual minority when the other twin agrees and when the other twin disagrees. In cols. 5 and 6, sexual orientation is self-reported sexual minority instrumented with sibling-reported sexual minority. In cols. 11 and 12, sexual orientation difference is the difference between self-reported sexual minority difference instrumented with sibling-reported sexual minority difference. Regressions contain varying sets of controls. The small set of controls includes age, age squared, and gender. The extended set of controls also includes years of schooling and two personality traits: neuroticism and extraversion. *F*-test statistics indicate whether these additional characteristics are jointly statistically significant. Cross-sectional regressions are tabulated in cols. 1–6; number of (minority) observations refers to number of (minority) twins. Twin fixed-effect regressions are tabulated in cols. 7–12; number of (minority) observations refers to number of twin pairs (of different orientation). Robust standard errors are in parentheses. Sample means (standard deviations) of the fraction of prejudiced straight workers in identical and full twin samples are .695 (.117) and .702 (.122).

\* Significant at the 10% level.  
 \*\* Significant at the 5% level.  
 \*\*\* Significant at the 1% level.

regress occupational prejudice, as measured by the fraction of prejudiced workers among straight workers in each occupation, on whether a worker is gay or lesbian using the worker's own report on sexual orientation with additional controls for those demographic variables that are arguably exogenous (age, age squared, and gender). The estimated effect is negative and statistically significant, confirming previous associations that gay and lesbian workers tend to work in less prejudiced (or more tolerant) occupations. The least-squares estimate of  $-0.04$  indicates that gay and lesbian workers have, on average, 4% fewer prejudiced fellow workers. This estimate is not so large but not small either. It is not so large when we consider the occupation ranking in table 3; that is, a 4 percentage point change does not take the average gay and lesbian worker much further up the tolerance ranking. It is not small either when we consider the standard deviation of occupational prejudice of 0.12; that is, gay and lesbian workers experience a 30% of a standard deviation decrease in the fraction of prejudiced fellow workers relative to straight workers.

In column 3 we run the same regression but replace the sexual orientation dummy with a dummy that equals one if the worker and the worker's twin sibling agree on whether the worker is gay or lesbian as well as another dummy that equals one if the worker reports to be gay or lesbian but the twin sibling believes that the worker is straight. The estimates indicate that, in particular, gay and lesbian workers whose sexuality is accurately perceived by the worker's twin sibling end up working in more tolerant occupations. The estimate is negative, statistically significant, and larger than the estimate we find for disagreeing twins. If we interpret these estimated coefficients within a disclosure framework and recognize that prejudice-based segregation depends on the ability of employers and fellow employees to distinguish the workers' sexual orientation, our results indicate that occupational segregation is indeed driven by those gay and lesbian workers with disclosed identities (assuming that sibling disclosure is informative about workplace disclosure). If we interpret these estimates within a measurement error framework and recognize that classification error will attenuate any sexual orientation estimate, our results indicate that classification error has a substantial impact on our sexual orientation estimates with fewer misclassified observations among those gay and lesbian workers with concordant twin reports. In column 5 we allow for misclassification in the worker's sexual orientation report and make use of the cross-twin report as an instrument to eliminate the downward bias caused by classification error. The sexual orientation estimate is negative, statistically significant, and somewhat larger than previous estimates.<sup>12</sup> According to Black et al. (2000), the estimates in columns 3 and 5 represent lower and upper bounds on the

<sup>12</sup> Possible weak instrument concerns raised by, among others, Staiger and Stock (1997) do not apply. In our application the  $F$ -statistic from the first-stage regression equals 115.56.

degree to which gay and lesbian workers shy away from workplace contact with prejudiced colleagues; that is, gay and lesbian workers have between 7 and 9 percentage points fewer prejudiced colleagues.

Our primary concern in interpreting these cross-sectional estimates is that there may be important differences in productivity and occupational tastes between straight, gay, and lesbian workers and that these differences may drive gay and lesbian workers into more tolerant occupations, regardless of the fraction of prejudiced fellow workers. We apply two empirical strategies to check whether gay and lesbian workers choose to work in more tolerant occupations because of higher fractions of tolerant fellow workers or because of something else. As a first strategy, we remove the influence of those observed and unobserved characteristics that identical twins share by adding twin fixed effects to the previous three specifications. In columns 7, 9, and 11, we see that all the estimated sexual orientation effects are statistically significant, negative, and comparable to, if not larger than, the cross-sectional sexual orientation estimates.<sup>13</sup> As a second strategy, we run the same regressions except that variables measuring years of schooling and two personality traits (including extraversion and neuroticism) have been added. We choose these variables because they likely correlate with productivity and vocational tastes. In the even columns 2–12, we obtain somewhat smaller cross-sectional and twin fixed-effects estimates of sexual orientation when years of schooling and personality variables are included as additional controls. Some estimates are less precise, however. In panel B we therefore report estimates using an extended sample of all twins, including identical and nonidentical twins. Most of the sexual orientation results are comparable to those found for the sample restricted to identical twins, but with larger samples, the estimates are now obtained with more precision.

### B. Alternative Measures of Occupational Prejudice

The use of the fraction of prejudiced workers amid straight workers by occupation as a measure of occupational prejudice has several advantages. It seems a natural way to define occupational prejudice and offers a convenient interpretation. But there is more than one natural way to measure occupational prejudice. It is therefore important to test whether gay and lesbian workers also choose to work in less prejudiced occupations using other measures of occupational prejudice; that is, we test the robustness of our segregation estimates against six alternative measures of occupational prejudice.

The first two prejudice measures compute occupational shares of prejudiced workers among straight men and straight women separately. Since

<sup>13</sup> In cols. 11 and 12 we allow for correlated measurement errors between the twins' reports of their own sexual orientation and of their siblings' sexual orientation. We follow Ashenfelter and Krueger (1994) and instrument the twins' self-reported twin difference in sexual orientation with the cotwin's reported twin difference in sexual orientation.

gay/lesbian workers are more/less likely to work in more female-oriented occupations, it is possible that the prejudice measure used above (with corresponding estimates) captures not only prejudicial sentiments but also tastes for typical male- (or female-) oriented occupations. Prejudice measures that do not rely on gender shares avoid this problem. The third prejudice measure redefines a prejudiced worker as a worker with at least two prejudiced responses. Classification error likely decreases. Tolerant workers can respond to a single item incorrectly; however, it is less likely that tolerant workers do this more than once. We calculate occupational shares on the basis of the more stringent prejudice definition amid straight workers, weighted by representative gender shares. The fourth prejudice measure allows individual workers to have varying discriminatory tastes. We do this by calculating the fraction of prejudiced responses for each straight worker.<sup>14</sup> We then average this prejudice fraction across all straight workers at the occupational level, again weighted by representative gender shares. If there is a continuum of prejudicial tastes rather than a simple prejudice dichotomy, this occupational prejudice measure may reflect reality more closely. The fifth and sixth prejudice measures are based on two particular prejudice statements (“homosexuality is obscene and vulgar” and “homosexuals should be allowed to dance with each other in public places” in table 1); that is, we calculate occupational averages for each prejudice statement separately. If the first statement reflects a more severe degree of prejudice than the second statement and there is substantial variation between the two statements across occupations, it is possible that gay and lesbian workers sort accordingly.

Table 5 shows the results for the alternative measures of occupational prejudice. For reasons of brevity, we report only regression results of occupational prejudice on self-reported sexual orientation with the smaller set of controls including age, age squared, and gender. Least-squares and fixed-effects results come from the sample of identical twins. With all alternative prejudice measures we find a significant and negative relationship between occupational prejudice and sexual orientation. The sexual orientation estimates are comparable to the baseline results reported in table 4 and do not differ in any material way across specifications. All cross-sectional estimates indicate that gays and lesbians work in occupations with, on average, about 3%–5% fewer prejudiced fellow workers. The fixed-effects estimates are even larger. A table containing estimates similar to those reported in table 5

<sup>14</sup> If workers provide prejudiced responses to all prejudiced statements, the prejudice fraction equals one. If workers give no prejudiced responses at all, the prejudice fraction equals zero. More formally, let individual  $i$  provide a response  $d_i^m$  to prejudice statement  $m$ , where  $d_i^m$  equals one for a prejudiced response and zero otherwise. In addition, let the same individual provide responses to  $M_i$  prejudice statements. The individual prejudice index is then defined as the fraction of prejudiced responses, or  $(d_i^1 + \dots + d_i^{M_i})/M_i$ .

**Table 5**  
**Estimating the Relationship between Occupational Prejudice and Sexual Orientation**  
**Using Alternative Measures of Occupational Prejudice**

	% Prejudiced Amid Straight Male Workers		% Prejudiced Amid Straight Female Workers		% Prejudiced (at Least Two Prejudiced Responses)		Average Prejudice Index		% Homosexuality Is Vulgar and Obscene		% Homosexuals Should Not Dance in Public Places	
	Least Squares (1)	Fixed Effects (2)	Least Squares (3)	Fixed Effects (4)	Least Squares (5)	Fixed Effects (6)	Least Squares (7)	Fixed Effects (8)	Least Squares (9)	Fixed Effects (10)	Least Squares (11)	Fixed Effects (12)
Worker is gay or lesbian	-.052 (.020)**	-.075 (.031)**	-.055 (.027)**	-.111 (.032)**	-.041 (.021)*	-.090 (.024)**	-.030 (.015)**	-.076 (.019)**	-.034 (.021)*	-.090 (.022)**	-.039 (.017)**	-.089 (.023)**
Observations	1,144		1,119		1,144		1,144		1,144		1,144	
Minority observations	36		35		36		36		36		36	
Alternative measures of occupational prejudice:												
Mean	.746		.624		.550		.342		.397		.435	
Standard deviation	.157		.145		.141		.111		.135		.121	

NOTE.—The dependent variable is occupational prejudice, measured in various ways. The independent variable of interest is self-reported sexual minority. Cross-sectional least-squares regressions control for age, age squared, and gender. Odd columns report cross-sectional estimates. Even columns report twin fixed-effects estimates. Occupational prejudice is measured in six ways. In cols. 1 and 2, occupational prejudice is the fraction of prejudiced workers amid male straight workers in two-digit occupations; in cols. 3 and 4, occupational prejudice is the fraction of prejudiced workers amid female straight workers in two-digit occupations; in cols. 5 and 6, occupational prejudice is the fraction of workers with at least two prejudiced responses amid all straight workers in two-digit occupations; in cols. 7 and 8, occupational prejudice is the average of the prejudice index amid male and female straight workers in two-digit occupations, weighted by representative gender shares; in cols. 9 and 10, occupational prejudice is the fraction of workers who think homosexuality is vulgar and obscene amid male and female straight workers in two-digit occupations, weighted by representative gender shares; and in cols. 11 and 12, occupational prejudice is the fraction of workers who think homosexuals should not be allowed to dance with each other in public places amid male and female straight workers in two-digit occupations, weighted by representative gender shares. Robust standard errors are in parentheses.

\* Significant at the 10% level.

\*\* Significant at the 5% level.

\*\*\* Significant at the 1% level.



for specifications with the extended set of controls and for the pooled sample of identical and nonidentical twins is available from the authors on request.

In sum, our results indicate that gays and lesbians sort themselves into tolerant occupations, regardless of how we define tolerant occupations; that the sorting effect is not large but not small either; and that there is little evidence of any strong impact from either observable variables that arguably correlate with productive skills and vocational preferences or unobservable variables that strongly correlate with genetic and family background factors.

## VI. Dual Results

In this section we will study occupational segregation from the perspective of prejudiced workers. This is of interest for two reasons. First, it gives us another way to look at prejudice-based segregation; that is, prejudice-based segregation could just as easily originate from straight workers who do not want to work alongside gay and lesbian workers (which is the duality in occupational segregation). Second, it allows us to test whether our interpretation of prejudice-based segregation is robust to competing mechanisms. In particular, if there is asymmetry in sorting, it is unlikely that our segregation results are driven by reverse causation or unobservable characteristics correlated with being gay or lesbian, tolerating gays and lesbians, and preferring particular occupations.

### A. Occupational Choice of Straight Workers

To see whether prejudiced workers actively avoid workplace contact with gay and lesbian workers, we run a variety of regression models analogous to equation (4); that is, we take the fraction of gay and lesbian workers by occupation as the relevant measure of sexual composition and let it depend on workers' tolerance and (observable and unobservable) productivity and taste factors:

$$F_{ijk}^H = \alpha_2 D_{ij} + \beta_2 X_{ij} + \gamma_2 U_{ij} + \epsilon_{ijk}, \quad (6)$$

where indices  $i$ ,  $j$ , and  $k$  stand for worker  $i$  born in family  $j$  working in occupation  $k$ ;  $F^H$  represents the occupational fraction of gay and lesbian workers;  $D$  denotes the workers' intolerance to working alongside gay and lesbian workers, which equals one for workers who are prejudiced and zero otherwise; and the error term is  $\epsilon$ , which is assumed uncorrelated with  $U$ .

Table 6 contains the estimates based on equation (6). In this table we report least-squares and fixed-effects results. We concentrate only on straight twin pairs. In panel A we report estimates based on identical twins. In panel B we report estimates based on identical and fraternal twins. With occupational minority fractions defined at the two-digit level and prejudiced workers

**Table 6**  
**Estimating the Relationship between Minority Occupations and Prejudiced Workers**

	Least Squares					Fixed Effects						
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
A. Identical straight twins:												
Worker is prejudiced (at least one prejudiced response)	-.004 (.002)**	-.005 (.002)***			-.002 (.001)***	-.002 (.001)**	-.001 (.003)	-.002 (.003)			-.001 (.001)	-.001 (.001)
Worker's prejudice index (fraction of prejudiced responses)			-.008 (.003)**	-.010 (.003)***					.001 (.005)	.001 (.005)		
Observations	1,200		1,200		1,200		600		600		600	
Prejudiced observations	787				787		185		420		185	
B. Identical and fraternal straight twins:												
Worker is prejudiced (at least one prejudiced response)	-.004 (.001)***	-.004 (.001)***			-.002 (.001)***	-.002 (.001)***	-.000 (.002)	-.000 (.002)			-.000 (.001)	-.001 (.001)
Worker's prejudice index (fraction of prejudiced responses)			-.007 (.002)**	-.007 (.002)***					-.001 (.004)	-.001 (.004)		
Observations	2,230		2,230		2,230		1,115		1,115		1,115	
Prejudiced observations	1,503				1,160		363		830		363	
Schooling and personality trait controls included		X		X		X		X		X		X
F-tests for joint significance:												
Identical twins		2.69**		3.55**		2.68**		1.07		1.02		3.11**
All twins		2.70**		2.83**		4.44**		2.83**		2.85**		1.49

NOTE.—The dependent variable is the fraction of minority workers. In cols. 1–4 and 7–10, we take the fraction of minority workers at two-digit occupations. In the other columns we take the fraction of minority workers at one-digit occupations. The independent variable of interest is worker prejudice. In cols. 3, 4, 9, and 10, worker prejudice represents the fraction of prejudiced responses. In the other columns, worker prejudice represents those workers with at least one prejudiced response. Regressions contain varying sets of controls. The small set of controls includes age, age squared, and gender. The extended set of controls also includes years of schooling and two personality traits: neuroticism and extraversion. *F*-test statistics indicate whether these additional characteristics are jointly statistically significant. Cross-sectional regressions are tabulated in cols. 1–6; the number of (prejudiced) observations refers to the number of twins (with at least one prejudiced response). Twin fixed-effect regressions are tabulated in cols. 7–12; the number of (prejudiced) observations refers to (discordant) twin pairs. Robust standard errors are in parentheses. The sample means (standard deviations) of the fraction of minority workers in one- and two-digit occupations in identical and full twin samples are .049 (.012), .049 (.012), .047 (.032), and .048 (.032).

\* Significant at the 10% level.  
 \*\* Significant at the 5% level.  
 \*\*\* Significant at the 1% level.

defined as workers with at least one prejudiced response, we find in column 1 a negative prejudice effect, confirming that the labor market tends to segregate prejudiced workers from gay and lesbian workers. In column 3 we change the dependent variable and replace the binary prejudice indicator with a continuous prejudice index, measured as the fraction of prejudiced responses. We find a statistically significant and negative estimate, suggesting that sorting is more pronounced for those workers who are more prejudiced. Workers who respond to all questions in a prejudiced way experience a 25% of a standard deviation decrease in the fraction of minority workers. In column 5 we switch the independent variable to minority fractions measured in one-digit occupations. This aggregated minority share measure is based on fewer occupations and few minority workers and therefore is less noisy. We find again negative least-squares prejudice estimates, albeit smaller. Since one-digit occupations cover multiple two-digit occupations, perhaps we find somewhat smaller effects because we miss occupational segregation at the two-digit level. Interestingly, we find that the cross-sectional estimates do not change much when we include variables measuring the worker's years of schooling and personality (cols. 2, 4, and 6 in panel A) or extend the sample with nonidentical twins (cols. 1, 3, and 5 in panel B).

What is remarkable, however, is that these least-squares results change when we include twin fixed effects. In columns 7–12 we report the twin fixed-effects estimates, which are intended to correct for the potential influence of the workers' unobservable and inherited characteristics that may be correlated with their attitudes toward gay and lesbian workers. All the estimated effects fall substantially and are no longer statistically significant. In almost all cases, the estimates are close to zero. Comparison between the cross-sectional and fixed-effects estimates suggests that the negative relationship between the share of minority workers and worker prejudice is to a large degree driven by the unobserved endowments that twins share and possibly relate to differences in productivity and taste; that is, prejudiced majority workers shy away from minority workers, for reasons unrelated to their prejudicial sentiments.

Is it possible that measurement error is driving the fixed-effects results? Because our measure of prejudice is taken from sensitive prejudice questions with possible response error, it may be that measurement error biases our estimated effects to zero. To test for this, we focus on the special case of classical measurement error in a continuous dependent variable in which attenuation bias in least-squares and twin fixed-effects estimation is subject to standard textbook errors-in-variables inconsistencies; that is, we concentrate on the continuous prejudice index and adjust the parameter estimates and standard errors by imposing predetermined attenuating factors (which themselves are determined by reliability ratios and correlations) in estimation. Our data contain information on reliability ratio and corre-

lation.<sup>15</sup> For the continuous prejudice index, we estimate a reliability ratio of 0.911 and an intrapair correlation of about .517. While not reported in the table, we find that the least-squares and fixed-effects estimates are biased downward by about 10% and 20% (relative to what the estimates would be in the absence of measurement error). Since the unadjusted fixed-effect estimates are small, the adjusted fixed-effect estimates remain practically unchanged. We therefore believe that our zero fixed-effects estimates do not result from measurement error.

### B. Reverse Causation

An alternative mechanism to explain prejudice-based segregation under sexual minority workers is that minority exposure weakens majority prejudice. If prejudiced workers get to know gay and lesbian workers sufficiently well, it is possible that closer contact creates empathy (or reduces ignorance when prejudice is caused by ignorance) and weakens the discriminatory attitudes held by prejudiced workers. This is an example of reverse causation, with important consequences. If prejudice is not the cause of little exposure, it may very well be that exposure is the cure for prejudice. There is some recent evidence on the prejudice relationship between exposure, race, and gender suggesting that more minority exposure indeed leads to less discrimination among majority members (Boisjoly et al. 2006; Beaman et al. 2009). These studies, however, do not examine the relationship between prejudice and majority exposure to sexual minorities.

To let this reverse causation story be consistent with our pattern of results, we should find that prejudiced straight workers when exposed are more likely to sympathize with gay and lesbian workers. In twin samples in which we examine how gay and lesbian workers sort themselves into more tolerant occupations using twin fixed-effects regressions, reverse causation may serve as an alternative explanation. In twin samples in which we examine why prejudiced workers do not seem to work in gay and lesbian concentrated occupations, however, it does not. The argument goes as follows. Reverse causation predicts that those twins exposed to a higher fraction of gay and lesbian workers than their twin siblings are less prejudiced, captured by the fixed-effects estimator of a reverse regression,  $\text{Cov}(\Delta D, \Delta F^H) / \text{Var}(\Delta F^H)$ . In table 6 we show that prejudiced twins are not more likely to choose occupations with lower fractions of gays and lesbians than their unprejudiced siblings (or  $\text{Cov}(\Delta F^H, \Delta D) / \text{Var}(\Delta D) = 0$ ). Because the zero fixed-effects results imply zero fixed-effects results in reverse regressions, our estimates indicate that prejudiced workers are not affected by

<sup>15</sup> A reliability ratio in the prejudice index is derived by making assumptions about classical nonresponse to the prejudice questions and uncorrelated response errors across prejudice questions.

their gay and lesbian fellow workers, neither in the way they choose occupations nor in the (reverse) way they express their homophobic attitudes.<sup>16</sup> Hence, there is no evidence of reverse causation.

### C. Omitted Characteristics

Another possibility is that some omitted characteristics are correlated with being gay or lesbian, tolerating gays and lesbians, and preferring particular occupations. This would then account for the sorting of gays and lesbians and more tolerant straights into similar occupations. This interpretation is consistent with all the least-squares results we find. This interpretation is also consistent with the fixed-effects results we find in tables 4 and 5, assuming that the impact of these omitted characteristics is not controlled for with the inclusion of twin fixed effects. This interpretation, however, is inconsistent with the zero fixed-effects results reported in table 6, suggesting that unobservable characteristics related to being gay or lesbian, tolerating gays and lesbians, and preferring particular occupations are not our biggest concern.

## VII. Twin Validity

While the idea of using identical twins as a natural experiment has some intuitive appeal, we are aware that the twin variation we use to estimate prejudice-based segregation does not possess the properties of a clean and well-defined experiment. The next and final step of our analysis (before concluding) is to investigate the internal and external consistency of our twin estimates.

### A. Twin Differences in Occupational Taste and Productivity

Can we take previous estimates from twins with different sexual orientation as causal? The concern here is that our segregation estimates are biased if twins with different sexual orientation are also different in ways related to their productive skills and occupational tastes.

With this in mind, we follow a recent study of Sandewall et al. (2009), who empirically test for differences in ability using twins with different amounts of schooling within a returns to schooling application. They take observable IQ measures as a proxy for ability and add IQ to their twin fixed-effect wage regressions. If twins are more similar than different, they argue that IQ should affect neither wages nor the fixed-effect estimate of the return to schooling. Instead, they find that IQ has a strong positive effect on wages and lowers the fixed-effect return estimate. They therefore treat the corresponding re-

<sup>16</sup> Note that we have also tested our prediction and estimated reverse regressions to check whether being in an occupation with a high fraction of gays and lesbians does not make a worker more tolerant (or less prejudiced). As expected, we find that the estimated fixed-effects coefficients attached to the fraction of minority workers are always small and never statistically significant.

turns to schooling estimate as biased because twins are more different than similar.

In applying a similar approach, we take years of schooling and two personality traits, extraversion and neuroticism, as observable proxies for unobservable productivity and occupational tastes.<sup>17</sup> If differences in years of schooling and personality traits precede the differences in sexual orientation (otherwise causation might be going in the other direction), a causal interpretation of our estimates requires that adding years of schooling and personality traits to our fixed-effect regressions should lead to neither a significant impact of schooling and personality nor a decline in the sexual orientation estimate. In table 7 we first investigate whether there are twin differences in education and personality traits. We find that twins with different sexual orientations are also twins with different amounts of schooling; that is, gay and lesbian workers are higher educated than straight workers, and these differences are also observed within twin pairs. In table 4 we then assess the robustness of our findings against twin differences in measurable productivity and occupational tastes. We find that schooling and personality traits matter in explaining why gay and lesbian twins work in more tolerant occupations; that is, the *F*-statistics shown at the bottom of table 4 indicate that cross-sectional and fixed-effect coefficients attached to schooling, extraversion, and neuroticism are jointly significantly different from zero. We note, however, that the large fall in *F*-statistics (we observe when moving from cross-sectional to fixed-effect regressions) suggests that the larger part of the variation in occupational choice due to measurable skills and occupational tastes is driven by genes and family environment. We also find that our sexual orientation estimates fall, but not by much, when schooling, extraversion, and neuroticism are included in our fixed-effect regressions.

Returning to the question raised above, can we take previous estimates from twins with different sexual orientations as causal? It will be difficult to prove (beyond any doubt) that gay and lesbian twins shy away from prejudiced occupations because of prejudiced employers and colleagues; that is, previous estimates suggest that the (identical) twins we use to identify prejudice-based segregation are very similar but not fully identical, which leaves the door open for other explanations of the occupational sorting patterns we observe. Nonetheless, our empirical analysis clearly shows that gay and lesbian workers choose different occupations, consistent with models of prejudice-based segregation. If we control for important twin similarities among twin pairs with different sexual orientation, such as their genetic makeup and childhood environment, our estimates continue to be sizable

<sup>17</sup> Years of schooling is an obvious skill measure. Personality measures have also been shown to vary with occupational choice. See, e.g., the work of Mueller and Plug (2006) and Borghans et al. (2008). In addition, the same personality measures have been used by Isacson (1999) to test for similarity among identical twin pairs within a returns to schooling application.

**Table 7**  
**Twin Differences in Education and Personality Traits**

	Characteristics		Differences in Characteristics	
	Gay/Lesbian (1)	Straight (2)	Concordant Pairs (3)	Discordant Pairs (4)
Education:				
Years of schooling	13.194 (2.379)	12.529 (2.318)*	.020 (2.036)	1.554 (2.506)***
Personality traits:				
Neuroticism	.602 (.313)	.634 (.296)	.002 (.295)	-.037 (.311)
Extraversion	.436 (.289)	.393 (.264)	.012 (.268)	-.047 (.303)
Observations	36	1,108	544	28

NOTE.—Columns 1 and 2 report means and standard deviations (in parentheses) of characteristics of gay/lesbian twins and straight twins among our sample of monozygotic twins. Columns 3 and 4 report means and standard deviations of twin differences in characteristics within concordant and discordant twin pairs.

\* Cols. 1 and 2 and cols. 3 and 4 are significantly different from each other at the 10% level.

\*\* Cols. 1 and 2 and cols. 3 and 4 are significantly different from each other at the 5% level.

\*\*\* Cols. 1 and 2 and cols. 3 and 4 are significantly different from each other at the 1% level.

and significant, suggesting that gays and lesbians sort into less prejudiced occupations. If we control for observed differences among twin pairs with different sexual orientations, such as their level of schooling, our estimates do not change in any material way and keep on showing that gays and lesbians sort into less prejudiced occupations. We should note, though, that it is not clear whether years of schooling is the appropriate variable to include in our regressions. If twin differences in schooling result from twin differences in sexual orientation, we should treat twin differences in schooling as an outcome variable and not as a control variable. In such regression models (not reported) we find a sizable and significant schooling advantage for gay and lesbian workers, which is in itself consistent with a prejudice model. If gay and lesbian twins make their school choices with a prejudiced labor market in mind, these estimates suggest that gays and lesbians may go to a university more often than their straight twin siblings just to avoid working in more prejudiced occupations.

### B. External Validity

Our main estimation sample is nearly two decades old, consists of a sample of twins, and includes a small number of minority observations. This raises questions about the external validity of our findings. To address this issue we were able to obtain data from the Australian Study of Health and Relationships (ASHR), which is a large representative population-based survey with information on sexual orientation, prejudice, and occupational choice (Smith et al. 2003). The data were collected at some point during the 2001–2 interval. In this survey respondents were asked whether

they think of themselves as heterosexual, bisexual, gay, or lesbian. The same respondents were also asked if they think sexual relationships between same-sex men (and same-sex women) are wrong. Respondents could answer on a five-point scale: 5, strongly agree; 4, agree; 3, neither; 2, disagree; and 1, strongly disagree. We define workers as prejudiced workers if they agree or strongly agree, classify occupations into one-digit occupational groups, and then calculate shares of prejudiced workers among the straight workers in each occupation. In a similar way, we classify workers who are gay, lesbian, or bisexual as sexual minority workers and calculate shares of minority workers in each occupation. With this information we can then estimate reduced-form models similar to the ones we present in equations (4) and (6) using another data source.

Table 8 compares the estimation results for this more recent sample with our results using the ATR data. Column 2 shows that the ASHR includes 548 minority observations, which is a much larger representation of gay and lesbian workers. The share of minority observations is very similar in both samples. In columns 1 and 2 we consider the occupational choices of gay and lesbian workers and find that the cross-sectional esti-

**Table 8**  
**Replication Regressions**

	ATR (1)	ASHR (2)
Dependent variable: % prejudiced:		
Worker is gay or lesbian	-.038 (.019)**	-.029 (.004)***
Observations	1,144	18,855
Minority observations	36	548
Dependent variable: % minority:		
Worker is prejudiced	-.004 (.002)**	-.003 (.000)***
Observations	1,200	6,963
Minority observations	787	1,890

NOTE.—In the top panel, we regress the fraction of prejudiced workers by occupation on worker sexual orientation controlling for age, age squared, and gender. In the bottom panel, we regress the fraction of minority workers by occupation on worker prejudice controlling for age, age squared, and gender. Column 1 reports least-squares estimates from the Australian Twin Registry, in which occupations are defined at the two-digit level according to the Australian Standard Classification of Occupations (1st ed.). Column 2 reports least-squares estimates from the Australian Study of Health and Relationships, in which occupations are defined at the one-digit level according to the Australian Standard Classification of Occupations (2nd ed.). In the ATR and ASHR, gay and lesbian workers are workers who respond affirmatively to the sexual minority question. In the ATR, prejudiced workers are workers with at least one prejudiced response. In the ASHR, prejudiced workers are workers who agree with the statement that sexual relationships between same-sex men (same-sex women) are wrong. Standard errors are in parentheses.

\* Significant at the 10% level.

\*\* Significant at the 5% level.

\*\*\* Significant at the 1% level.



mates obtained with the ASHR are very similar to our previous estimates. Gays and lesbians in the ASHR sort themselves into more tolerant occupations just as twin gays and lesbians do. If we turn to the occupational choices of prejudiced straight workers, the estimates in the bottom panel are also very similar. We should note that in the ASHR a lower proportion of respondents were classified as prejudiced than in the ATR because prejudice is measured differently in the ASHR.

In sum, we have been able to replicate our cross-sectional results using a more recent and much larger representative data set. These findings imply that workers who are gay, lesbian, straight, and/or prejudiced in the ASHR make their occupational decisions similarly to twin workers in the ATR, which supports the external validity of our results.

### VIII. Discussion and Concluding Remarks

In this article we present direct evidence that prejudiced straight workers and gay and lesbian workers choose different occupations, consistent with models of prejudice-based segregation. All our cross-sectional specifications show negative and almost always significant associations between concentrations of sexually prejudiced workers and concentrations of sexual minority workers. The partial impacts we estimate for gay and lesbian workers are not large but not small either; that is, gay and lesbian workers have, on average, 3–9 percentage points fewer prejudiced colleagues, which corresponds to a 25%–75% of a standard deviation decrease in the fraction of intolerant colleagues. In addition, these partial impacts are more pronounced for gay and lesbian workers with disclosed identities, robust to the inclusion of unobserved factors that are inherited and observed factors that strongly correlate with productive skills and vocational preferences, and comparable to patterns of occupational sorting we find using additional data with a much greater representation of gay and lesbian workers.

Interestingly, we show that the observed degree of prejudice-based segregation is entirely driven by the behavioral responses of gay and lesbian workers who plausibly prefer to work in unprejudiced occupations. Our twin fixed-effects specifications show that prejudiced workers choose to work in those occupations not because of lower fractions of gay and lesbian workers but because of something else. One possible explanation for this pattern is that it does not make much sense for straight workers to act on their prejudicial urges when workplace contact with gay and lesbian workers is mostly indirect. And conversely, it does make sense for gay and lesbian workers to act on their taste for tolerant occupations when workplace contact with less tolerant workers in any randomly chosen occupation is almost unavoidable.

While the twin evidence we present in this article strongly suggests that the sexual prejudices held by employers and employees play an important role in the occupational choices of gay and lesbian workers in ways predicted

by prejudice theories, we must be careful in drawing causal conclusions. If twins with different sexual orientations are also different in other important characteristics, we do not necessarily prove prejudice-driven labor market discrimination. As such, we believe that our regression results provide us with a road map for future work in getting a better sense of how prejudice affects the occupational choice of gay and lesbian workers. One natural direction we propose is to explore how sexual orientation affects occupational choice through other channels (possibly unrelated to prejudice) such as field of studies, fertility decisions, and locational choice. Another direction is to explore how the discriminatory practices of prejudiced employers affect the labor market earnings of gay and lesbian workers. Learning more about these mechanisms will be the challenge in our future work.

## Appendix

In this appendix we discuss how the sexual orientation questions are asked in the questionnaires. Women and men are sent different questionnaires. Sexual orientation questions are asked at the end of the questionnaire, after the section with attitude questions. In the women's questionnaire, information about the twin's sexual orientation is derived from a sexual orientation question, which also includes an explanatory note. The full question reads as follows:

Do you consider yourself: heterosexual (straight); bisexual; homosexual (lesbian or gay)?

In this question, "heterosexual" means that sexually, you desire contact only with men; "bisexual" means that you desire contact with both men and women; "homosexual" means that you desire contact with only women.

In the men's questionnaire, the sexual orientation question was phrased a little differently. The full question reads as follows:

Do you consider yourself: heterosexual (straight); bisexual; homosexual (gay)?

In this question, "heterosexual" means that sexually, you desire contact only with women; "bisexual" means that you desire contact with both men and women; "homosexual" means that you desire contact with only men.

The questionnaire also contains a family section in which questions are asked about the sexual orientation of siblings, including twin siblings. The full question reads as follows:

For each of your natural brothers and sisters including your twin please give the following information by filling in or circling the appropriate responses below:

Starting with your oldest brother as No. 1 at the left, give his age; his sexuality to the best of your knowledge (H = Heterosexual or Straight; B = Bisexual; and G = Gay or Homosexual). . . . Then on the right side of the page, rate your sisters exactly the same way (except that L stands for Lesbian or Homosexual). Please write down the ages of all your brothers and sisters. (Unless you have more than 6 of either; in this case, stop after the oldest 6.) However, you only need to rate the sexuality of your brothers and sisters who are at least 18 years old. Finally, circle the number by your twin.

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