

SOCIAL SCIENCES

Denial of service to same-sex and interracial couples: Evidence from a national survey experiment

Brian Powell,*† Landon Schnabel,* Lauren Apgar

Legislatures and courts are debating whether businesses can deny services to same-sex couples for religious reasons. Yet, little is known about public views on this issue. In a national survey experiment, Americans ($n = 2035$) responded to an experimental vignette describing a gay or interracial couple refused service. Vignettes varied the reason for refusal (religion/nonreligious) and by business type (individual/corporation). Results confirm greater support of service refusal by the self-employed than by corporations and to gay couples than to interracial couples. However, religious reasons for refusal to gay couples elicit no more support than do nonreligious reasons. In the first national study to experimentally analyze views on service refusal to sexual minorities, we demonstrate that views vary by several factors but not by whether the refusal was for religious reasons.

INTRODUCTION

Legislators and courts are debating whether businesses should be able to deny services to same-sex couples for religious reasons. This issue has reached the U.S. Supreme Court in the upcoming case of *Masterpiece Cakeshop Ltd. v. Colorado Civil Rights Commission*. Proponents of service refusal contend that requiring a business to provide services undermines religious freedom—and, for some businesses, artistic expression and freedom of speech. Opponents respond that service refusal to sexual minorities discriminates in the same way as service refusal to racial minorities did in the past. These debates are occurring at the same time that Americans' views on gay rights have liberalized and same-sex marriage has been legalized (1–4). Yet, we know little of what the public thinks about denial of services. The few surveys exploring this topic have not parsed the conditions under which people are more or less likely to support refusal (5–7).

We report patterns from the first national survey experiment that clarifies conditions under which the American public endorses or rejects businesses' right to deny service. The experiment answers three questions:

(1) Does support for service refusal apply only to religious beliefs or extend to other opinions? Advocates of religious accommodation laws emphasize freedom of religion. Yet, we do not know whether and to what extent Americans distinguish between religious versus non-religious reasons for refusal.

(2) Does support for service refusal apply only to self-employed individuals or extend to closely held corporations? In *Burwell v. Hobby Lobby Stores Inc.*, the Supreme Court ruled that the federal Religious Freedom Restoration Act protects closely held corporations. As legal scholars continue to debate whether religious freedom laws should protect individuals only or also corporations (8, 9), we do not know whether and to what extent the American public distinguishes between self-employed individuals and corporations.

(3) Does support for service refusal apply only to same-sex couples or extend to interracial couples? Critics of religious accommodation laws question whether it would be publicly acceptable for businesses to refuse services to other minority groups (10). Because the public and scholars have drawn parallels between rights for sexual and racial minorities (3, 11) and religious reasons have been used historically and

contemporaneously to oppose interracial marriage (12), we use interracial couples for comparison. We do not know whether Americans would support refusal to a federally protected class (racial minorities) and, if so, whether the patterns will be similar to or different from those for refusal to sexual minorities.

We draw on original data from a population-based survey experiment to answer these questions. The survey experiment was conducted online by GfK (formerly Knowledge Networks) as part of the Time-sharing Experiments for the Social Sciences (TESS) program. GfK data have been used in numerous studies across the social sciences because, unlike most online panels, GfK recruits a nationally representative sample through address-based sampling methods (13–15). Our survey experiment was fielded from 11 to 19 March 2015, and surveys were completed by 2035 respondents.

Respondents were randomly assigned to one of eight conditions. In each condition, respondents were shown a vignette featuring a couple who attempted to purchase wedding invitation portraits and was refused. We selected photography for these vignettes because it could be interpreted as a case of artistic expression and freedom of speech.

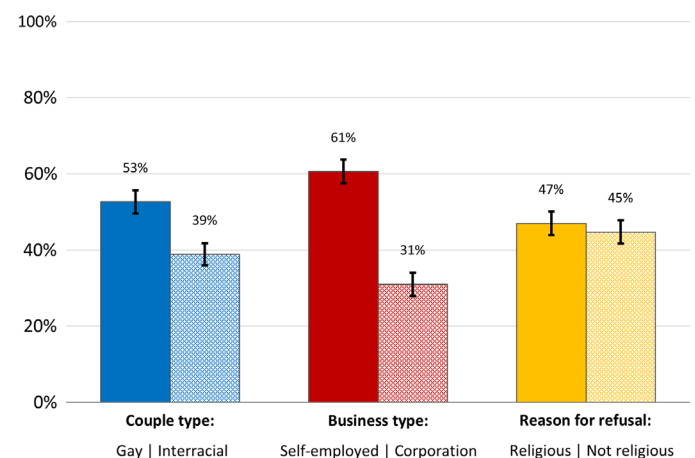


Fig. 1. Percent of respondents who support business service refusal by experimental manipulations. Respondents were asked whether the business should be allowed to refuse or required to provide services to the couple in the vignette. Vignettes manipulated (i) type of business refusing services (self-employed individual or a closely held corporation), (ii) reason for refusal (religious or nonreligious), and (iii) who is being refused services (gay couple or interracial couple). Bars indicate 95% confidence intervals (CIs). $n = 2035$.

Department of Sociology, Indiana University, Bloomington, IN 47405, USA.

*These authors contributed equally to this work.

†Corresponding author. Email: powell@indiana.edu

The vignettes in our 2 × 2 × 2 full factorial experiment systematically varied the reason for refusal, the business-type and the couple-type refused services. The refusal was either for explicitly religious reasons or for explicitly nonreligious reasons. The business refusing services was either a self-employed individual (“self-employed photographer”) or a closely held corporation (“corporate chain owner”). Finally, the couple denied service was either “Michael and Jason, a gay couple” or “Michael and Jennifer, a black man and a white woman.” With manipulations in brackets, the vignettes read as follows:

[Michael and Jason, a gay couple/Michael and Jennifer, a black man and a white woman] are getting married and want to have photos taken to send out with their wedding invitations. They went to a [self-employed photographer/photography studio in a large chain store] because they heard [he was the best photographer/it was the best place] in the area for engagement portraits. The photographer refused to take their picture. He explained that [(because he is religious/although he is not religious)/(because the corporate chain owner is religious/although the corporate chain owner isn’t religious)] [he/the owner] doesn’t approve of [gay/interracial] marriage.

After the vignette, the survey asked: “Should the [self-employed photographer/photography studio in a large chain store] be allowed to refuse services to the couple? Or should [he/it] be required to provide services to the couple as [he/it] would to all other customers?” Respondents were then asked to explain their answer to this question. To determine the extent to which views regarding marital rights shape views toward business refusal, we also asked respondents whether they agreed or disagreed that same-sex couples (if they received a gay-couple vignette) or interracial couples (if they received an interracial couple vignette) should be allowed to marry.

Below, we present support for business service refusal by each of the three experimental manipulations (couple type, business type, and reason for refusal). Next, we describe views by each vignette and then by

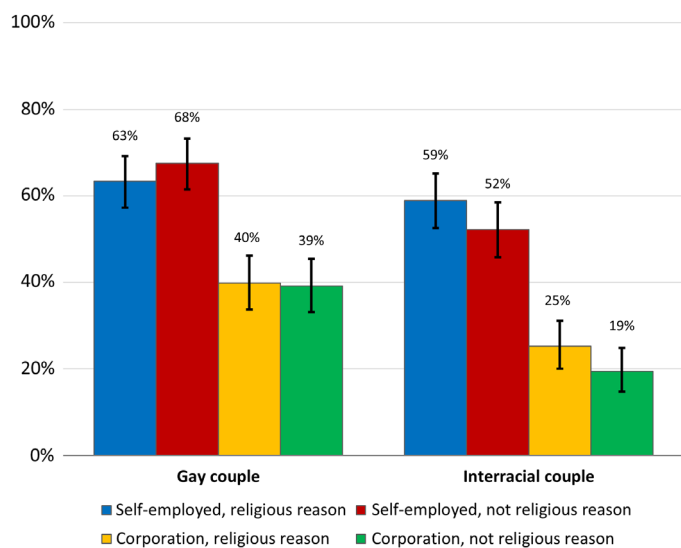


Fig. 2. Percent of respondents who support business service refusal by each experimental condition. Respondents were asked whether the business should be allowed to refuse or required to provide services to the couple in the vignette. Vignettes manipulated (i) type of business refusing services (self-employed individual or a closely held corporation), (ii) reason for refusal (religious or non-religious), and (iii) who is being refused services (gay couple or interracial couple). Bars indicate 95% CIs. *n* = 2035.

support for marriage rights. Finally, we present patterns from multivariate regression models predicting support for service refusal to same-sex couples.

RESULTS AND DISCUSSION

As shown in Fig. 1, more than half (53%) of the respondents support denial of services to a gay couple. The difference by couple type (gay/interracial) is significant, but notably, nearly two-fifths (39%) of the public endorse refusal of services to interracial couples. The effect of business type is even greater: Twice as many respondents (61%) endorse service refusal by a self-employed photographer than by a corporation (31%). In marked contrast to the couple-type and business-type manipulations, whether the service refusal is for explicitly religious or explicitly nonreligious reasons appears inconsequential. A similar, and statistically indistinguishable, percentage of respondents support service refusal for religious (47%) or nonreligious reasons (45%).

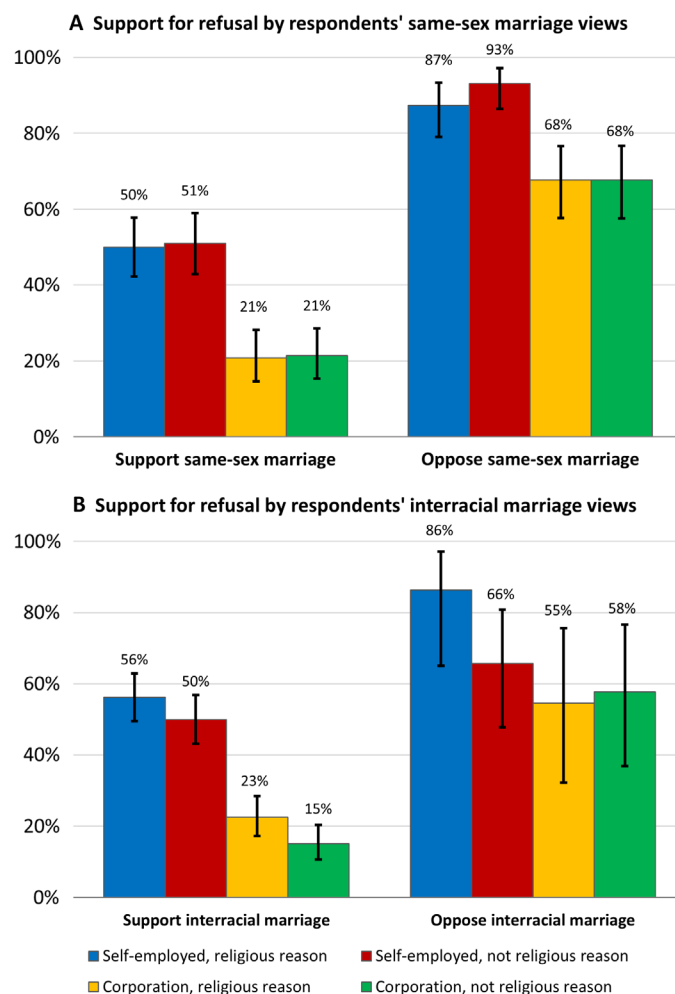


Fig. 3. Percent of respondents who support business service refusal by views on same-sex and interracial marriage. Respondents were asked whether the business should be allowed to refuse or required to provide services to the couple in the vignette. Respondents were also asked about their views on same-sex marriage if they received a gay couple vignette (A) and on interracial marriage if they received an interracial couple vignette (B). Bars indicate 95% CIs. *n* = 2035.

However, it is possible that respondents distinguish between religious and nonreligious reasons for gay couples but not for interracial couples. Figure 2, which presents mean levels of support for each of the conditions sorted by couple type, discounts this possibility. In evaluating the vignettes regarding gay couples, Americans do not differentiate between religious and nonreligious reasons (self-employed, 63 versus 68%; corporation, 40 versus 39%). In contrast, there is some evidence of

people differentiating based on religious reasons in the interracial couple conditions (16).

Respondents' views regarding marital rights are similar to those reported in other national surveys: 61% support same-sex marriage and 90% support interracial marriage (see table S1). As shown in Fig. 3, a substantial proportion (approximately one-half) of same-sex marriage advocates also supports service refusal by the self-employed photographer;

Table 1. Effects of experimental manipulations and other factors on support for service refusal to same-sex couples. This table uses multivariate logistic regression models to examine the effects of experimental vignette manipulations and other factors on support for business service refusal (1) versus opposition (0). An interaction between the experimental manipulations is not significant and is not included. SEs are in parentheses.

	Model 1	Model 2	Model 3
Experimental manipulations			
Religious reason for refusal	-0.061 (0.135)	0.003 (0.145)	-0.033 (0.152)
Self-employed photographer	1.155*** (0.137)	1.312*** (0.149)	1.475*** (0.160)
Sociodemographic factors			
Female	-0.367** (0.137)	-0.438** (0.147)	-0.343* (0.154)
LGB	-1.275*** (0.346)	-0.814* (0.363)	-0.684 (0.378)
Black	-0.631* (0.261)	-0.639* (0.282)	-0.787** (0.297)
Latinx	-0.227 (0.212)	-0.148 (0.225)	-0.158 (0.237)
Other	-0.179 (0.257)	-0.022 (0.273)	0.033 (0.285)
Age (in decades)	0.203*** (0.047)	0.171*** (0.051)	0.143** (0.054)
Some college	-0.293 (0.168)	-0.193 (0.179)	0.077 (0.190)
Bachelor's degree	-0.350 (0.193)	-0.313 (0.208)	-0.146 (0.221)
Graduate degree	-0.502* (0.219)	-0.239 (0.239)	0.053 (0.253)
Married	0.129 (0.152)	-0.149 (0.164)	-0.208 (0.173)
Children in household	0.262 (0.175)	0.213 (0.187)	0.182 (0.197)
Northeast	-0.591** (0.218)	-0.641** (0.234)	-0.745** (0.247)
Midwest	-0.550** (0.211)	-0.640** (0.226)	-0.647** (0.238)
South	-0.171 (0.190)	-0.437* (0.206)	-0.525* (0.218)
Metropolitan status	-0.514** (0.193)	-0.437* (0.206)	-0.264 (0.219)
Political and religious factors			
Seven-point scale of political views, conservative higher		0.327*** (0.055)	0.234*** (0.058)
Religiously affiliated, non-evangelical		0.358 (0.209)	0.393 (0.216)
Religiously affiliated, evangelical		1.037*** (0.256)	0.805** (0.269)
Attend religious services weekly		0.684*** (0.173)	0.396* (0.186)
Marriage views			
Oppose same-sex marriage rights			1.654*** (0.183)
Constant	-0.299	-2.132	-2.359
<i>n</i>	1033	1033	1033
McFadden's <i>R</i> ²	0.111	0.198	0.260

P* < 0.05. *P* < 0.01. ****P* < 0.001.

a smaller proportion (approximately one-fifth) supports service refusal by the corporation. Opponents of same-sex marriage are even more likely to endorse service refusal. Neither proponents nor opponents of same-sex marriage distinguish between religious and nonreligious reasons for refusal to same-sex couples.

The patterns regarding interracial couples are strikingly similar. Approximately one-half of proponents of interracial marriage supports the photographer's right to deny service to the interracial couple; approximately one-fifth supports a corporation's right to deny service. The overall pattern is also similar to that among opponents of same-sex marriage; however, the patterns regarding opponents of interracial marriage should be interpreted with caution given the small number of people who opposes interracial marriage. These patterns suggest that the greater support for refusal to same-sex couples than to interracial couples is a function of greater opposition to same-sex marriage than to interracial marriage (see table S2). In other words, if support for same-sex marriage were as high as that for interracial marriage, then Americans' views on service refusal would not vary by couple type.

Table 1 presents regression models that show how sociodemographic and attitudinal factors predict support for refusal to same-sex couples across conditions (we present parallel patterns for interracial couples in table S3). Model 1 includes sociodemographic factors only. Women, sexual minorities, blacks, younger people, those with graduate degrees, northeastern and midwesterners, and those in metropolitan areas are significantly less likely than their counterparts to support service refusal. The racial pattern is notable: Blacks, who are less supportive of same-sex marriage than whites, are more opposed to business service refusal to gay couples. Model 2 adds political and religious factors. Respondents with conservative political views, who identify as evangelicals, or who attend religious services weekly are more likely to endorse service refusal. Model 3 confirms that views on same-sex marriage are closely linked to views on service refusal.

Subgroup analyses also demonstrate consistency in the effect of the experimental manipulations—especially refusal reason (religious/nonreligious)—across groups. For example, Fig. 4 shows that evangelical support for a self-employed photographer's service refusal to a gay couple is high regardless of the reason (religious reasons, 80%; non-religious reasons, 85%); similarly, nonevangelicals do not distinguish between religious and nonreligious reasons (58 and 61%, respectively). We could identify no subgroup that significantly distinguishes between religious and nonreligious reasons for refusal to gay couples (see tables S4 and S5). The business-type manipulation (self-employed/corporation) operates similarly across groups with one exception: Compared to white respondents, African Americans make an even greater distinction between corporations and self-employed proprietors that refuse services (see table S6). Finally, we do find that some groups—including conservatives, evangelicals, and those who attend religious services more frequently—are more likely than their counterparts to support refusal to same-sex couples versus interracial couples because of their greater opposition to same-sex marriage rights (see table S4).

Open-ended responses provide insight into why Americans oppose or endorse service refusal. Those who opposed refusal were largely consistent in their justifications across experimental conditions. To them, denial of service to any minority group is discrimination. Several people who read the same-sex couple vignettes—and thus were unaware of the parallel interracial couple vignettes—explicitly equated service refusal to gay couples with historical denial of services to African Americans. In contrast, the plurality of respondents who supported the businesses' right to refuse services framed their support in terms of in-

dividual rights and libertarianism. Others who endorsed refusal expressly said they supported the businesses' right to refuse because of their own opposition to same-sex relationships. Some people supported the businesses' right to refuse, although they disapproved of the refusal. This view was common among those who support same-sex marriage, who often assumed that customers would boycott discriminatory businesses. To them, the free market will penalize discriminatory businesses to the extent that they will either eventually provide services or be put out of business. Notably, discussions of artistic expression and freedom of speech are mostly absent despite their importance in legal discussions.

CONCLUSIONS

In the first national study to experimentally examine public opinion on business service provision to sexual minorities, we demonstrate that views vary by several factors but not by whether it was a case of religious freedom. Federal law currently prohibits service refusal to racial minorities but not to sexual minorities, with religious accommodation used to justify denial of services to same-sex couples. The experimental

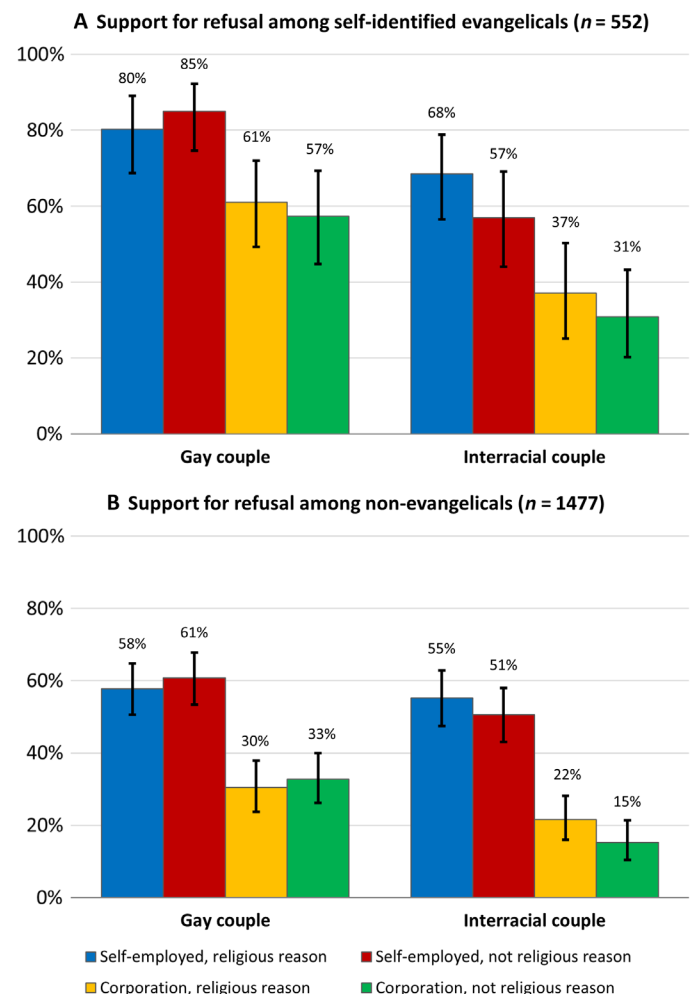


Fig. 4. Percent of respondents who support business service refusal by whether evangelical. Respondents were asked whether the business should be allowed to refuse or required to provide services to the couple in the vignette. Respondents were also asked about whether (A) or not (B) they self-identify as evangelical or born again. Bars indicate 95% CIs. $n = 2029$.

patterns demonstrate that Americans are no more likely to endorse refusal to same-sex couples for explicitly religious reasons than for explicitly nonreligious reasons. Moreover, support for refusal of services, especially by self-employed proprietors, extends beyond gay couples to interracial couples. These patterns indicate that many Americans endorse discrimination against minority groups, including federally protected classes. American support for the denial of services to same-sex couples is driven not by religious-specific freedom but, instead, by general libertarianism and personal opposition to marriage rights.

MATERIALS AND METHODS

Data collection

Our nationally representative online survey experiment was funded by a National Science Foundation (NSF) grant to the TESS program [NSF grant 0818839; Freese and Druckman as co-principal investigators (co-PIs)]. TESS provides a competitive opportunity for researchers across the social sciences to field general population experiments. Investigators propose experiments that are reviewed by TESS for the importance of their contribution to science and society. TESS studies appeared in a broad range of journals across disciplines, including *Science* (17).

The nationally representative survey experiments of TESS were fielded on GfK's (formerly Knowledge Networks) KnowledgePanel. The KnowledgePanel is a nationally representative, probability-based Web panel based on dual-frame sampling. This sampling frame combines random digit dialing (RDD) and address-based techniques. Therefore, the sample is representative of all households with cell phones and/or landlines (18). The sample is not limited to those with previous internet access: GfK provides respondents with internet access and any needed hardware. Research indicates that the representativeness of this sampling frame is equivalent to that of RDD (18). Because of the quality of the data and the unique delivery format that combines the benefits of visual presentation, automated skip logics, and mitigated desirability bias, numerous high-profile studies throughout the social and health sciences used data from the KnowledgePanel (19–21). The anonymous nature of the survey's online format, which may reduce the social desirability bias in responses, is well suited for our study.

A total of 3333 GfK panel members were randomly sampled and contacted via email to ask for their participation in the experiment. The surveys were fielded from 11 to 19 March 2015 and were collected from 2059 respondents (excluding 56 break-offs). During this time, national debates about business service refusal to same-sex couples had already begun, but the particular case soon going before the Supreme Court (*Masterpiece Cakeshop Ltd. v. Colorado Civil Rights Commission*) had not yet arisen. Therefore, opinions about this specific case could not have affected the results. The survey completion rate was 61.8%. The GfK-reported cumulative response rate, which took into consideration the recruitment rate into the GfK sample, the completion of the profile (demographic) survey, and the completion of the experiment, was 5.6%.

Experimental manipulations

Each respondent was randomly assigned to one of eight conditions in the survey experiment. Each condition presented the respondent with a vignette describing a couple who attempted to purchase engagement portraits and was refused. The vignettes experimentally manipulated (i) the type of couple refused services, (ii) the type of business that refused services, and (iii) the reason for refusal (see appendix S1 for the full text of all vignettes) for a $2 \times 2 \times 2$ between subjects experimental design.

Type of couple refused services: Gay versus interracial

The couple who was refused services was either gay (Michael and Jason, a gay couple) or interracial (Michael and Jennifer, a black man and a white woman). To maximize the number of respondents answering each vignette, we asked about a gay couple instead of both gay and lesbian couples. Recent research suggested that there were no large differences between attitudes toward rights for gay and lesbian couples (3, 20). Pretest results provided similar patterns for attitudes toward gay and lesbian couples.

We explicitly stated the race of each member in the interracial couple. This approach, in contrast to others used to signal race (for example, "white-sounding" and "black-sounding" names), ensured that readers could not assume that the couple was racially homogeneous (22, 23). We depicted a black man and a white woman because they constituted most black-white couples (24). To parallel the interracial couple wording, we explicitly stated that Michael and Jason were a gay couple. We selected names that were popular for those born in the mid-1980s because people in their late 20s were at the median age of first marriage in the United States. (25). According to the U.S. Social Security Administration, Michael and Jennifer were among the top five most popular names for children born from 1983 to 1988. Jason was a popular boy name without obvious religious or class connotations that started with a J to parallel Jennifer.

Type of business refusing services: Self-employed photographer versus corporation

The business refusing services was either a self-employed individual (self-employed photographer) or a closely held corporation (corporate chain owner). In *Burwell v. Hobby Lobby*, Supreme Court Justice S. Alito described closely held corporations as companies "owned and controlled by members of a single family" (26). Rather than use a term that respondents may not understand (closely held corporation), we signaled in the vignette that the business was a closely held corporation through the owner's decision-making power over the corporate chain. Pretest diagnostics indicated that respondents typically saw the business in the chain condition as a corporation and did not see the self-employed photographer as a corporation.

Reason for refusal of services: Religious versus nonreligious

The reason for refusal was either religious or nonreligious disapproval. For the religious reason conditions, the photographer indicated that either he or the chain owner was religious and did not approve of gay/interracial marriage. To ensure that respondents did not infer a religious reason for refusal in the nonreligious conditions, we made it very clear that the refusal was for nonreligious reasons: The photographer explicitly stated that although he or the chain owner was not religious, he or the chain owner did not approve of gay/interracial marriage.

Vignette-based questions

Respondents answered four questions after reading their assigned vignettes (see appendix S2). The first question asked whether the business should be allowed to refuse services or be required to provide services. The response options were modeled on a question in a Pew survey (5), and at random, half of the respondents received the "allowed to refuse" option first and the other half received the "required to provide" option first.

The second question measured the strength of the respondent's support or opposition to service refusal. It asked whether the respondent felt strongly or not strongly that the photographer/corporate chain should be allowed to refuse services/required to provide services. The strength question was modeled on public opinion questions in the

American National Election Studies' 2012 Direct Democracy Study (27). Additional analyses using this second question to create an ordinal outcome measure yielded equivalent results, as shown in table S7.

The third question asked respondents to describe why they believed that the photographer/corporate chain should be allowed to refuse services or be required to provide services. Respondents were asked to write a few sentences and were provided with a text box that allowed up to 2000 characters.

The fourth question, modeled on the Constructing the Family Survey (3), asked the extent to which respondents agreed or disagreed that gay and lesbian couples should be allowed to marry (if assigned the gay vignette) or that interracial couples should be allowed to marry (if assigned the interracial vignette). Our sample's level of support for same-sex marriage (61%) and interracial marriage (90%) is consistent with the level reported in other national surveys such as the General Social Survey. Therefore, despite high levels of support for business service refusal, our sample is not more conservative than other samples on marriage rights.

Additional measures

Respondents' demographic information, as well as other measures relevant to this study, was collected in previous surveys by GfK and provided to the researchers. These measures include gender (female, 1), race/ethnicity (white, 1; black, 2; Latinx, 3; other/multirace, 4), age (continuous), education (college, 1), region (categorical measure for where respondent lives), metropolitan status (metropolitan, 1), sexual orientation (LGB, 1), political ideology (conservative, 1; moderate, 2; liberal, 3), political affiliation (Republican, 1; Independent, 2; Democrat, 3), evangelical (evangelical or born-again Christian, 1), religious affiliation (religiously affiliated, 1), frequency of religious service attendance (never, 1; more than once a week, 6), and gay contact (has any gay friends or relatives, 1).

Qualitative analysis

To analyze our open-ended question, we first read all responses for emergent themes in the data. We then identified commonly used themes and created a code sheet that described and gave examples of the themes. One co-author subsequently coded each open-ended response with all applicable themes (up to three per response). Another co-author then read a random selection of responses to gauge inter-coder reliability (that is, that the original coding accurately categorized the themes).

Quantitative results verification

To ensure the replicability of these patterns, the quantitative analysis was conducted by one co-author, independently replicated by another co-author, and then independently replicated by someone not on the research team.

Statistical analysis

This study examined support for service refusal. First, we examined levels of support for refusal by experimental conditions and corresponding 95% CIs among the full sample and then among subgroups. Second, we conducted multivariate logistic regression analyses. All analyses are restricted to cases with full information on the service provision question and the marriage rights question ($n = 2035$). Twenty-four cases, or 1% of the total sample ($N = 2059$), were excluded because of missing data on experimental items or the marriage rights item. Most covariates had no missing data, and less than 2% of data were missing

on any given covariate. We used multiple imputation to account for missing data on covariates, where the number of imputed data sets equals 20. Analyses with and without imputation yielded equivalent results.

The random assignment of respondents to each experimental condition ensured that vignette groups had statistically indistinguishable background attributes (see table S8). Overall, the sample's sociodemographic and ideological characteristics, as well as overall support for same-sex marriage, compared favorably with nationally representative surveys, such as the General Social Survey. We presented unweighted analyses in the text; weighted analyses yielded substantively equivalent results (see Fig. 2, fig. S1, Table 1, and table S9).

SUPPLEMENTARY MATERIALS

Supplementary material for this article is available at <http://advances.sciencemag.org/cgi/content/full/3/12/eaao5834/DC1>

Sensitivity checks and additional analyses

table S1. Proportion who supports business service refusal by respondents' attitudes on marriage rights for gay couples or interracial couples.

table S2. Effects of experimental manipulations and marriage rights on support for service refusal including both same-sex and interracial couple conditions.

table S3. Effects of experimental manipulations and other factors on support for service refusal to interracial couples.

table S4. Effects of manipulations by political affiliation, political ideology, evangelical identity, religious affiliation, frequency of religious service attendance, and gay contact.

table S5. Proportion who supports business service refusal by subgroups.

table S6. Effects of experimental manipulations by race.

table S7. Effects of experimental manipulations and other factors on an ordinal measure of strength of support for service refusal to same-sex couples.

table S8. Sample means by experimental condition.

table S9. Effects of experimental manipulations and other factors on support for service refusal to same-sex couples using survey weights.

fig. S1. Support for business service refusal by vignette for weighted full sample.

appendix S1. Vignettes.

appendix S2. Vignette-based questions.

REFERENCES AND NOTES

1. D. M. Baunach, Changing same-sex marriage attitudes in America from 1988 through 2010. *Public Opin. Q.* **76**, 364–378 (2012).
2. K. Kenneavy, Support for homosexuals' civil liberties: The influence of familial gender role attitudes across religious denominations. *Soc. Forces* **90**, 1347–1375 (2012).
3. B. Powell, C. Bolzendahl, C. Geist, L. C. Steelman, *Counted Out: Same-Sex Relations and Americans' Definitions of Family* (Russell Sage, 2010).
4. L. Schnabel, Gender and homosexuality attitudes across religious groups from the 1970s to 2014: Similarity, distinction, and adaptation. *Soc. Sci. Res.* **55**, 31–47 (2016).
5. Pew Research Center, Public sees religion's influence waning (2014); www.pewforum.org/files/2014/09/Religion-Politics-09-24-PDF-for-web.pdf.
6. Quinnipiac University, American voters back Iran deal by wide margin, Quinnipiac University national poll finds; voters oppose faith exclusion to serve gays (2015); www.quinnipiac.edu/news-and-events/quinnipiac-university-poll/national/release-detail?ReleaseID=2222.
7. Public Religion Research Institute, Who sees discrimination? Attitudes on sexual orientation, gender identity, race, and immigration status (2017); www.prrri.org/research/americans-views-discrimination-immigrants-blacks-lgbt-sex-marriage-immigration-reform/.
8. I. C. Lupu, Hobby Lobby and the dubious enterprise of religious exemptions. *Harv. J. Law Gender* **35**, 78–80 (2015).
9. A. J. Meese, N. B. Oman, Hobby Lobby, corporate law, and the theory of the firm: Why for-profit corporations are RFRA persons. *Harv. Law Rev.* **127**, 273–301 (2014).
10. T. Ring, Kan. lawmakers plan to revive "license to discriminate" bill (2014); www.advocate.com/politics/marriage-equality/2014/12/11/kan-lawmakers-plan-revive-license-discriminate-bill-0.
11. M. J. Rosenfeld, B.-S. Kim, The independence of young adults and the rise of interracial and same-sex unions. *Am. Sociol. Rev.* **70**, 541–562 (2005).
12. S. L. Perry, Hoping for a godly (white) family: How desire for religious heritage affects whites' attitudes toward interracial marriage. *J. Sci. Study Relig.* **53**, 202–218 (2014).

13. D. S. Pedulla, S. Thébaud, Can we finish the revolution? Gender, work-family ideals, and institutional constraint. *Am. Sociol. Rev.* **80**, 116–139 (2015).
14. J. Jerit, How predictive appeals affect policy opinions. *Am. J. Pol. Sci.* **53**, 411–426 (2009).
15. D. S. Yeager, J. A. Krosnick, L. C. Chang, H. S. Javitz, M. S. Levendusky, A. Simpser, R. Wang, Comparing the accuracy of RDD telephone surveys and internet surveys conducted with probability and non-probability samples. *Public Opin. Q.* **75**, 709–747 (2011).
16. Religious reasons for refusal have a significant effect when all interracial couple conditions are considered together (see table S3).
17. A. Franco, N. Malhotra, G. Simonovits, Publication bias in the social sciences: Unlocking the file drawer. *Science* **345**, 1502–1505 (2014).
18. Time-sharing Experiments for the Social Sciences, Introducing TESS (2015); www.tessexperiments.org/introduction.html#data.
19. A. Baker, Race, paternalism, and foreign aid: Evidence from U.S. public opinion. *Am. Polit. Sci. Rev.* **109**, 93–109 (2015).
20. L. Doan, A. Loehr, L. Miller, Formal rights and informal privileges for same-sex couples: Evidence from a national survey experiment. *Am. Sociol. Rev.* **79**, 1172–1195 (2014).
21. K. Palmer, M. Walls, Limited attention and the residential energy efficiency gap. *Am. Econ. Rev.* **105**, 192–195 (2015).
22. S. J. Correll, S. Benard, I. Paik, Getting a job: Is there a motherhood penalty? *Am. J. Sociol.* **112**, 1297–1338 (2007).
23. D. S. Pedulla, The positive consequences of negative stereotypes: Race, sexual orientation, and the job application process. *Soc. Psychol. Q.* **77**, 75–94 (2014).
24. U.S. Census Bureau, Married couples by race and hispanic origin of spouses: 1980 to 2009 (2011); www.census.gov/compendia/statab/2011/tables/11s0060.pdf.
25. Social Security Administration, Popular names in 1984 (2014); www.ssa.gov/cgi-bin/popularnames.cgi.
26. *Burwell, Secretary of Health and Human Services et al. v. Hobby Lobby Stores Inc. et al.* (Docket no. 13–354. Argued, 25 March 2014. Decided, 30 June 2014; www.supremecourt.gov/opinions/13pdf/13-354_olp1.pdf).
27. American National Election Studies, 2012 direct democracy study (2012); www.electionstudies.org/study_pages/anes_specialstudy_2012_directdem/anes_specialstudy_2012_directdem.htm.

Acknowledgments: We thank the TESS PIs, J. Freese and J. Druckman, for their suggestions. The data are publicly available from the TESS program (www.tessexperiments.org/data/schnabelBR47.html). We are also grateful to L. Doan for providing an independent replication of the results. Institutional Review Board (IRB) guidelines for human subjects were followed (Indiana University IRB protocol no. 1502860539). **Funding:** Data for this project were collected by TESS (NSF grant 0818839). **Author contributions:** B.P. conceived the project. L.S. and L.A. designed and pretested the experiment in consultation with B.P. B.P., L.S., and L.A. fielded the experiment and analyzed the findings. L.S. performed the statistical analyses, and L.A. verified them. L.S. drafted the manuscript. B.P. and L.S. revised the manuscript. **Competing interests:** The authors declare that they have no competing interests. **Data and materials availability:** All data needed to evaluate the conclusions in the paper are present in the paper and/or the Supplementary Materials. Additional data related to this paper may be requested from the authors.

Submitted 4 August 2017
Accepted 17 November 2017
Published 20 December 2017
10.1126/sciadv.aao5834

Citation: B. Powell, L. Schnabel, L. Apgar, Denial of service to same-sex and interracial couples: Evidence from a national survey experiment. *Sci. Adv.* **3**, eao5834 (2017).

Denial of service to same-sex and interracial couples: Evidence from a national survey experiment

Brian Powell, Landon Schnabel and Lauren Apgar

Sci Adv 3 (12), eaao5834.
DOI: 10.1126/sciadv.aao5834

ARTICLE TOOLS <http://advances.sciencemag.org/content/3/12/eaao5834>

SUPPLEMENTARY MATERIALS <http://advances.sciencemag.org/content/suppl/2017/12/18/3.12.eaao5834.DC1>

REFERENCES This article cites 16 articles, 1 of which you can access for free
<http://advances.sciencemag.org/content/3/12/eaao5834#BIBL>

PERMISSIONS <http://www.sciencemag.org/help/reprints-and-permissions>

Use of this article is subject to the [Terms of Service](#)

Science Advances (ISSN 2375-2548) is published by the American Association for the Advancement of Science, 1200 New York Avenue NW, Washington, DC 20005. 2017 © The Authors, some rights reserved; exclusive licensee American Association for the Advancement of Science. No claim to original U.S. Government Works. The title *Science Advances* is a registered trademark of AAAS.