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Race-Ethnicity and Medical Services for Infertility: Stratified Reproduction in a Population-based Sample of U.S. Women

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Abstract

Evidence of group differences in reproductive control and access to reproductive health care suggests the continued existence of “stratified reproduction” in the United States. Women of color are overrepresented among people with infertility but are underrepresented among those who receive medical services. The authors employ path analysis to uncover mechanisms accounting for these differences among black, Hispanic, Asian, and non-Hispanic white women using a probability-based sample of 2,162 U.S. women. Black and Hispanic women are less likely to receive services than other women. The enabling conditions of income, education, and private insurance partially mediate the relationship between race-ethnicity and receipt of services but do not fully account for the association at all levels of service. For black and Hispanic women, social cues, enabling conditions, and predisposing conditions contribute to disparities in receipt of services. Most of the association between race-ethnicity and service receipt is indirect rather than direct.

Keywords: infertility, medical services, path analysis, race, treatment

Research on U.S. health disparities has shown that the incidence of health conditions and access to health care are unequally distributed across racial/ethnic and social class groupings. Evidence of differences in reproductive control and access to reproductive health care is particularly strong, suggesting the continued existence of “stratified reproduction” (Colen 1986). Marginalized women are more likely to receive medical care that impedes fertility, such as sterilization, and less likely to receive care that facilitates fertility (King and Meyer 1997). These patterns appar-

ently reflect social values about who deserves to be a mother (Roberts 1997; Solinger 2005).

Western media often constructs the infertility patient as a middle-class white woman, implicitly depicting poor and non-white women as hyper-fertile (Bell 2009, 2010; Sandelowski and de Lacey 2002). Consistent with this construction, most U.S. infertility clinics have primarily white patients, even though women of color are overrepresented among infertile women (Chandra and Stephen 2010). Our goal is to illuminate the divergence between the racial/ethnic composition

of infertile women and the racial/ethnic composition of women who receive medical services for infertility. We employ path analysis to investigate pathways between race-ethnicity and medical service use among a probability sample of 2,162 American women who reported ever experiencing an infertility episode and who self-identified as black, white, Hispanic, or Asian.

Theoretical Background

Colen (1986) coined the term *stratified reproduction* to describe how reproduction is structured across social and cultural boundaries, empowering privileged women and disempowering less privileged women. Stratified reproduction has long been part of American racial history (Collins 1990; Solinger 2005). Research on stratified reproduction usually focuses on contraceptive practices such as abortion, sterilization, and birth control: Infertility is rarely a focus (for an exception, see Culley, Hudson, and van Rooij 2009). Characterizations of the reproductive behavior of less privileged groups of women, combined with the presumed social implications of these characteristics, justify both the meaningfulness of racial categories and differential treatment of the less privileged (Roberts 1997; Rousseau 2009). At the same time that the “implicit fertility policy” (King and Meyer 1997) of the United States discourages births among poor women and women of color, it promotes births among white and middle-class women (Bell 2009, 2010; Sandelowski and de Lacey 2002). Recent state infertility mandates extend infertility services for people who can afford them, but Medicaid covers only contraception (King and Meyer 1997). Cussins (1998:73) argues that public characterizations in the United States divide women into “those for whom contraception is available if only they’d use it and those for whom there are infertility treatments.”

Race-Ethnicity and Medical Service Use for Infertility

Physicians define infertility as no conception after 12 months or more of regular, unprotected intercourse (American Society for Reproductive Medicine 2008). In a probability-based sample of women aged 25 to 50 in 12 Midwestern states, 38 percent reported infertility *at some point in their lives* (White et al. 2006). Pooled

data from the 1982–2002 National Survey of Fertility Growth (NSFG) surveys revealed that impaired fecundity rates (i.e., documented biomedical fertility barriers or failure to conceive after 36 months of regular intercourse) for black (19.8 percent) and Hispanic (18.2 percent) women were higher than those for white women (6.9 percent) (Bitler and Schmidt 2006).

Despite higher prevalence for non-white women, most studies of infertility in the United States have focused on white, middle-class women (Culley et al. 2009; Szkupinski-Quiroga 2002). These studies describe infertility as a distressing experience characterized by a spoiled identity, loss of control, stigmatization and isolation, and feeling “off time” (Becker 2000; Greil, Slauson-Blevins, and McQuillan 2010). The few studies of infertility among marginalized racial groups (see Becker et al. 2005; Ceballo 1999; Culley et al. 2009; Inhorn, Ceballo, and Nachtigall 2009; Szkupinski-Quiroga 2007) suggest similar levels of distress among women of color. Yet some effects are likely race specific. Szkupinski-Quiroga (2002) found that the infertile women of color experienced infertility not only as a challenge to personal identity, but also their ethnic identity. Thus, differences in medical service receipt should not reflect racial/ethnic differences in the personal and social impact of infertility.

Despite evidence that infertility is distressing, fewer than 50 percent of infertile U.S. women receive medical services (Chandra and Stephen 2010; Stephen and Chandra 2000). Using data from the NSFG (1982–2002), Bitler and Schmidt (2006) found that 15.8 percent of white women, 10.7 percent of black women, and 12.2 percent of Hispanic women reported ever having received medical services for infertility. Racial and class disparities persist in states with mandated infertility insurance coverage (Bitler and Schmidt 2006; Jain and Hornstein 2005). Analyses of the NSFG data conclude that race-ethnicity is not directly associated with medical service use for infertility once other factors, such as insurance and socioeconomic status (SES), are controlled (Chandra and Stephen 2010; Staniec and Webb 2007). Yet, other studies have found that racial disparities still remain (Bitler and Schmidt 2006). Studies that find racial differences disappear once SES and other variables are controlled suggest that the effects of race-ethnicity are mediated (Aneshensel 2009). To examine this issue, we use path analysis to analyze intervening variables between race/ethnicity and medical service use.

Factors Related to Helpseeking and Medical Service Use for Infertility

Following Greil, McQuillan, Shreffler, et al. (2010), we use social cues, individual cues, enabling conditions, and predisposing conditions to organize the explanatory variables. We conceptualize the effects of race-ethnicity as working through these variables. We focus here primarily on differing expectations for white versus non-white women.

Individual Cues

Individual cues refer to individual circumstances that affect helpseeking, but individual characteristics are strongly influenced by social structural realities. One primary individual cue is symptom salience. The more severely a health condition affects daily life, the more likely people are to seek care (Hannestad, Rortveit, and Hunskaar 2002). We measure symptom salience by the strength and immediacy of fertility intentions and by primary versus secondary infertility. Women who define themselves as trying to become pregnant (infertile with intent) are more likely to seek help than those who do not self-define as such (infertile without intent) (Greil, McQuillan, Johnson, et al. 2010). Black and Hispanic women are more likely to be infertile without intent than white and Asian women (Greil, McQuillan, Johnson, et al. 2010). Although researchers often assume that women are either trying or not trying to have children, the reality is more complex: Almost a quarter of U.S. women are “okay either way” (McQuillan, Greil, and Shreffler 2011). Pregnancy planfulness may be part of the (predominantly white) middle-class ideology of intensive motherhood (Lareau 2003). Indeed, Moos et al. (1997) discovered that many lower SES women in their focus groups had difficulty finding meaning in the term *planned pregnancy*. Thus, intent status is potentially relevant in mediating the association between race-ethnicity and medical services.

Women with primary infertility (no prior pregnancies) are more likely to seek help than those with secondary infertility (Greil and McQuillan 2004; Moreau et al. 2010). Although black and Hispanic women have higher rates of infertility, they are less likely to be childless (Chandra et al. 2005). This is partly because black and Hispanic women are more likely to have their first child at younger ages (Mathews and Hamilton 2009) and are therefore more likely to experience secondary infertility.

Age is an important variable to include because fertility options change with age. Older women are more likely to recognize a fertility problem and pursue treatment than younger women (Chandra and Stephen 2010; Greil and McQuillan 2004). Age of childbearing could explain some of the apparent race-ethnicity differences both because white women are more likely to try conceiving at older ages and because helpseeking is less likely for secondary infertility. Marital status is also associated with service receipt (Chandra and Stephen 2010). This may be due to social norms about marital childbearing—which differ by race and class—or because marriage is associated with other characteristics (e.g., insurance) that enable help seeking.

Social Cues

Seeking medical treatment depends upon social cues, including the support of friends and family, perceived approval for treatment, and perceived pressure for treatment from partners and parents (Pescosolido 1992; Sheppard et al. 2008). Social network support (Vogel et al. 2007), especially spousal support (Salandier et al. 1999), is associated with higher likelihood of helpseeking. Network members’ attitudes about health professionals influence willingness to seek treatment (Vogel et al. 2007). Women who know others who have sought medical help for infertility (Bunting and Boivin 2007) and who perceive that most of their friends have children (Greil et al. 2009) are more likely to seek help for infertility.

Ethnographic evidence suggests that social cues should differ for women of color compared to white women. Medical solutions to infertility are encouraged or discouraged to differing degrees in different racial/ethnic communities. White, McQuillan, and Greil (2005) suggest that lower levels of medical service use for infertility among racial minorities could be accounted for by cultural aversion to technological solutions, distrust of the medical establishment, and fear of being rejected for treatment. Distrust of medical institutions has been documented among many African Americans (Ojeda and Bergstresser 2008). Infertile black women also have reported a lack of support for treatment from their husbands (Inhorn et al. 2009). Perceived stigma delays helpseeking and lessens compliance with treatment regimens for a variety of conditions (Golberstein, Eisenberg, and Gollust 2008). Perceiving infertility as a stigmatized condition (Greil et al. 2009) or fearing the label *infertile* (Bunting and Boivin 2007) may de-

lay medical helpseeking for all women, but it may impact black women more because of black women's perceptions that infertility is rare among black women (Ceballo 1999).

Enabling Conditions

Theories of helpseeking refer to resources that make it possible to access desired help as "enabling conditions." Financial resources, including income and health insurance, are important (Jovanovic, Lin, and Chang 2003), but other resources such as education and social support are also associated with higher propensity to seek medical services (de Nooijer, Lechner, and de Vries 2003). In the United States, medical services are delivered on a fee-for-service basis and public insurance does not cover infertility treatments; therefore income and private health insurance can be crucial factors in medical service use for infertility. Few private plans cover a full range of infertility services. There is strong evidence that income and private health insurance contribute to racial/ethnic disparities in medical service use for infertility (Bitler and Schmidt 2006; Jain 2006; Jain and Hornstein 2005; Staniec and Webb 2007). Bell (2009, 2010), however, reminds us that SES matters in more subtle ways as well. For example, the sequencing and scheduling of appointments assumes flexibility and autonomy at work that few poor women have. In addition, the lower SES women that Bell (2009) interviewed reported being steered away from infertility treatment and pregnancy by medical personnel. Using data from the NSFG, Chandra and Stephen (2010) found that racial/ethnic differences in infertility service use disappeared after controlling for such SES variables as income, education, and health insurance coverage. It is likely that the "disappearing" effects do not mean that race-ethnicity is not significantly related to medical service use but, rather, that lack of resources is an important causal link between race-ethnicity and medical service use.

Predisposing Conditions

Belief that biomedical solutions are effective contributes to seeking care (de Nooijer et al. 2003). Positive prior experiences with medical institutions and

doctors should increase medical helpseeking compared to experiencing rude, uncaring, or ineffective care (Moore et al. 2004). As mentioned earlier, women of color are less likely to have had positive experiences with medical treatment, perceive themselves as welcome in infertility treatment settings, or interact with others who have positive views of infertility treatment.

Valuing motherhood, presumably because it heightens the salience of infertility, is associated with higher odds of medical service use for infertility (Greil et al. 2009). McQuillan et al. (2008) found that black and Hispanic women rated the importance of motherhood lower than white women, but this measure may not have been sensitive to perceptions of motherhood among black and Hispanic women. Ethical concerns about fertility treatments are associated with lower levels of medical service use for infertility (Greil et al. 2009); blacks are significantly more likely than whites to report ethical concerns about fertility treatments (Shreffler, Johnson, and Scheuble 2010). Ethical concern is also linked to religiosity (Shreffler et al. 2010), and blacks (Sahgal and Smith 2009) and Hispanics (Westoff and Marshall 2009) tend to be more religious.

We include only variables associated with medical service use for infertility in prior research. We disaggregate the possible sources of racial/ethnic disparities via path analysis. We determine how much of these disparities are due to social cues, individual cues, enabling conditions, and predisposing conditions. We expect that individual cues and enabling conditions will account for the largest proportion of racial/ethnic disparities.

Methodology

Sample

Data come from the National Survey of Fertility Barriers (NSFB), a random-digit-dialing telephone survey designed to assess social and health factors related to reproductive choices and fertility for U.S. women. The NSFB was funded by the Eunice Kennedy Shriver National Institute of Child Health and Human Development. Oversampling of census central office codes with high black or Hispanic populations helped to ad-

equately represent these women; 19.6 percent of the total sample and 24.8 percent of ever-infertile women identify as black, and 17.9 percent of the total sample and 19.7 percent of ever-infertile women identify as Hispanic. Women who have experienced infertility and women who desire additional children were also oversampled. Interviewing was conducted by the Survey Research Center (SRC) at Pennsylvania State University and the Bureau of Sociological Research (BOSR) at University of Nebraska- Lincoln using the same interviewer training and procedures. Internal review boards at both universities approved the study. Comprehensive methodological information is available at: <http://sodapop.pop.psu.edu/codebooks/nsfb/wave1/>.

Between September 2004 and December 2006, interviews were completed with 4,796 women ages 25 to 45. The analytic sample for this study includes the 2,162 women who met criteria for an infertility episode at some point in their lives and who self-identified as Hispanic, white, black, or Asian. We define an infertility “episode” as any period of 12 months or more of regular intercourse without conception and reporting either trying to conceive or being “okay either way” about getting pregnant. This was measured by a yes answer to either of the following: (1) “Was there ever a time when you were *trying* to get pregnant but did not conceive within 12 months?” or (2) “Was there ever a time when you regularly had sex without using birth control for a year or more without getting pregnant?” or if women reported having a pregnancy after a period of at least 12 months during which they were either *trying* to become pregnant or said they were “okay either way” and during which they were not breastfeeding.

Because the original survey was long (over 45 minutes to complete), respondents were randomly assigned to two-thirds of the items for each scale, which shortened the survey to an average of 35 minutes. This “planned missing” design retained all of the essential concepts, minimized respondent burden, and minimized bias by adding only missing data that is “missing completely at random” (MCAR) (Allison 2002). We use the mean of available scale items in the analyses. The response rate for the screener is 53.7 percent, which is typical for telephone surveys conducted in the past several years (McCarty et al. 2006). To assess generalizability of the NSFB, we compared

basic demographic characteristics for women ages 25 to 45 to the comparable age group in the 2005 Current Population Survey (CPS), which uses in-person interviews and has a 90 percent response rate. Weighting for undersampled women (those not intending to have a child), we found close correspondence between demographic distributions in both samples. On 22 of 34 demographic characteristics, the difference was within ± 1.5 percent. There was also little difference between the fertility-related variables in the NSFB and similar variables in the NSFG (2002) data collected nearest in time—a large U.S. in-person interview with a near 90 percent response rate. Thus, the NSFB sample is similar to well-respected federally funded and nationally representative personal interview surveys, justifying our confidence in the validity of this data set.

Measures

Focal variables. Respondents were asked a series of questions about information seeking, treatment seeking, tests, and treatments related to infertility. From these, we constructed variables for seeing a doctor, having tests, and receiving treatment. Anyone who meets the criteria for a higher level of medical services also meets the criteria for lower levels. For example, anyone who has had tests has also talked to a doctor and considered treatment. For this analysis, we treated these three variables as binary measures, because we were interested in testing whether the direct and indirect effects of race-ethnicity differed at different levels of service receipt.

Race-ethnicity was measured using the two standard census questions (U.S. Census Bureau 2011). Individuals who reported multiple races/ ethnicities were classified giving first priority to identification as “Hispanic” and second priority to identification as “black.” Based on this coding, dummy variables were constructed for *black*, *Hispanic*, and *Asian* compared to *white*. Those indicating “other” were eliminated due to small cell counts. We recognize that all racial/ethnic groups contain heterogeneous subgroups but use these larger categories as indicators of gross distinctions that reflect patterns of racial formation in the United States. Age was measured in years. Although age is an individual cue, it was

treated as an exogenous rather than an intervening variable because it is causally prior to all of the other variables.

Individual cues. Women were coded as having *infertility with intent* if they said they were trying to get pregnant but did not conceive within 12 months or if they reported having a pregnancy after a period of at least 12 months of trying to become pregnant. Women were coded as having *infertility without intent* if they qualified as infertile but did not state that they were trying to become pregnant at that time. *Primary infertility* was constructed from women's pregnancies histories. A value of 1 indicates that a woman had not experienced any pregnancies at the time of her first infertility episode. *Would like a(nother) baby* was coded 1 for those responding yes. *Never married* is a dummy variable comparing never married to all other marital statuses. We did not include separate dummies for divorced and currently married, because these variables refer to the time of the interview rather than the time of the infertility episode.

Social cues. *Most all family and friends have children* was assessed via the following question: "Thinking about your family and friends, would you say that all, most, some, few, or none of them have kids?" *Partner encourages* and *family encourages* were assessed via the questions "Did your [husband/partner or family or friends] strongly encourage, encourage, discourage, or strongly discourage seeking medical help, or was it mixed?" A response of strongly agree was coded as 1 and all other responses were coded as 0. *Perceived infertility stigma* is a three-item scale combining responses to three questions (e.g., "People who can't get pregnant without medical help often feel inadequate."). The response categories ranged from (1) strongly agree to (4) strongly disagree ($\alpha = .74$).

Enabling conditions. Due to sensitivity to income questions, *family income* was first constructed as an ordinal scale ranging from 1 (less than \$5,000) to 12 (\$100,000+). We then substituted the midpoint of each category for the category value in order to convert this into a continuous scale. Education was measured in years. Having *private insurance* was coded as 1 while all other options are coded as 0. Public health insurance is appropriately classified with no insurance because infertility benefits are not cov-

ered by Medicaid (Bitler and Schmidt 2006). Most private plans in the United States cover basic infertility services, but not assisted reproductive technology (ART).

Predisposing conditions. The predisposing conditions used in this study are importance of motherhood and ethical concerns about fertility treatment. *Importance of motherhood* was constructed by averaging responses to five questions (e.g., "Having children is important to my feeling complete as a woman") and is a single factor scale ($\alpha = .86$). Attitudes about *ethics* of ART were measured by responses to six scenarios to which respondents replied (1) no ethical problem, (2) some ethical problems, or (3) serious ethical problems ($\alpha = .86$).

Analytic Strategy

Because we are interested in exploring the direct and indirect effects of race-ethnicity on medical service use for infertility, we chose causal modeling using path analysis. We were guided by the model shown in Figure 1. For purposes of simplicity, Figure 1 shows "Race-ethnicity" as the exogenous variable, but we used three dummy variables for black, Hispanic, and Asian in the path analysis. Race-ethnicity was modeled to have both direct and indirect effects on medical service use for infertility. Age is not shown in the figure in the interest of clarity of presentation, but it was included in the model as a predictor of all other variables. Note that although we use the language of "effects" customary in path analysis, we recognize that with cross-sectional data, the causal links implied by the word *effects* cannot be demonstrated and that the most that can be demonstrated is the existence of associations. The analysis was conducted in Mplus. Binary logistic regression was performed for categorical dependent variables, and ordinary least squares (OLS) regression was performed for continuous dependent variables.

Results

Table 1 presents descriptive statistics by race-ethnicity for infertile women ($N = 2,162$). Infertile black women are less likely than white, Hispanic, and Asian

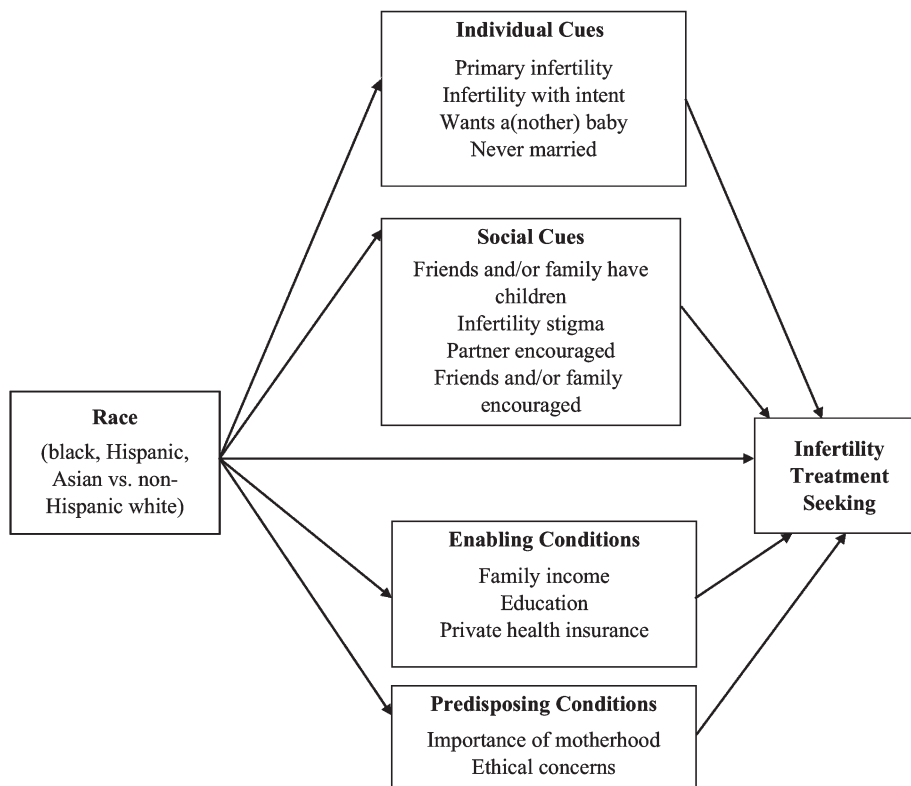


Figure 1. Path Model of Race-Ethnicity and Infertility Treatment through Mediating Paths

women to have talked to a doctor. Black and Hispanic women are less likely than white or Asian women to have had tests or received treatment, have primary infertility, and report that they were trying to become pregnant at the time of the infertility episode. Black women are more likely than other women to say they have never been married.

There are no significant differences by ethnicity in the percentage of women who say they would like a(nother) child. Asian women are less likely than women in other groups to report that most friends and family members have children. Black and Hispanic women have significantly higher infertility stigma scores than white women. Asian women are more likely and black and Hispanic women less likely to say that their partner or other family members encouraged them to pursue treatment.

Asian women differ significantly from white women on only two characteristics: They have greater ethical concerns about infertility treatments, and they have more education. Infertile black and His-

panic women are younger, have lower family incomes and less education, are less likely to have private insurance, and have lower importance of motherhood scores than white women. The other racial/ethnic groups all report higher levels of ethical concerns with infertility treatment than white women. To summarize, there are racial/ethnic differences on virtually all variables that we might suspect would mediate race-ethnicity and medical service use for infertility.

Table 2 provides coefficients for all the variables in the path analyses. The first three columns of data show direct paths of the race-ethnicity dummy variables to hypothesized mediating variables. We report β s for continuous mediating variables and odds ratios (OR) for binary mediating variables. The first set of coefficients provides information on paths from black to mediating variables. Black women are less likely than white women to have primary rather than secondary infertility (OR = .89) and are less likely to think of themselves as trying to become pregnant at the time of infertility episode (OR = .90). They are more likely

Table 1. Descriptive Statistics for Infertile Women ($N = 2,162$) by Race-Ethnicity

	White ($n = 1,189$)		Black ($n = 435$)		Hispanic ($n = 409$)		Asian ($n = 129$)	
	Percent or Mean	SD	Percent or Mean	SD	Percent or Mean	SD	Percent or Mean	SD
Infertility services								
Talked to a doctor	39		21		36		37**	
Had tests	31		16		17		37***	
Received treatment	21		8		11		24***	
Independent variables								
Age (25–45)	36.88	5.65	35.51	5.95+	34.65	55.33+	35.33	5.38***
Individual cues								
Primary infertility	38		25		32		55***	
Infertile with intent	54		42		55		57***	
Would like a(nother) baby	42		47		47		54	
Never married	8		37		2		14***	
Social cues								
Friends and family have kids	83		85		88		69**	
Infertility stigma	2.70	.57	2.77	.67+	2.60	.60+	2.50	.74***
Partner encouraged	24		11		21		35***	
Family encouraged	21		12		16		31***	
Enabling conditions								
Family Income ($\times \$10,000$)	6.69	3.96	4.58	3.56+	4.57	3.44+	7.84	6.12***
Education	14.51	2.51	14.13	2.40+	12.91	3.36+	17.18	2.72***
Private health insurance	76		57		53		80***	
Predisposing conditions								
Importance of motherhood	3.34	.66	3.18	.64+	3.19	.59+	3.36	.66***
Ethical concerns	1.48	.50	1.67	.55+	1.62	.57+	1.67	.57+***

Chi-square tests done for categorical variables. ANOVA with Tukey post-hocs for continuous variables.

+ indicates that a group is significantly different from non-Hispanic whites.

* $p < .05$; ** $p < .01$; *** $p < .001$

than white women to have never been married (OR = 1.30). They are less likely than white women to report encouragement for treatment from their partner (OR = .88) or family (OR = .93). Black women have significantly lower incomes on average than white women ($\beta = -.21$), have less education ($\beta = -.06$), and are less likely to have private health insurance (OR = .84). Black women also report lower scores on importance of motherhood ($\beta = -.09$) and higher scores on ethical concerns with treatment ($\beta = .15$). Therefore, several differences between white and black women could mediate differences in medical service use for infertility.

The second set of coefficients shows the paths from Hispanic women to mediating variables. Hispanic women are more likely to report that most of their friends and family have children (OR = 1.06), to view infertility as stigmatizing ($\beta = -.07$), and to report that family members encouraged them to pursue treatment (OR = .96). Hispanic women have significantly lower incomes ($\beta = -.18$) and education ($\beta = -.22$) than white women and are less likely to have private health insurance (OR = .81). Hispanic women also exhibit lower scores on importance of motherhood ($\beta = -.09$) and higher scores on ethical concerns with treatment ($\beta = .11$) compared to white women. The third

Table 2. Effects of Race on Seeing a Doctor, Getting Tests, Receiving Treatment, and Other Variables among Infertile Women (N = 2,162)

	Effect of Black on Variable				Effect of Hispanic on Variable				Effect of Asian on Variable				Effect on Seeing a Doctor				Effect on Getting Tests				Effect on Receiving Treatment							
	B	SE	OR/β	p	B	SE	OR/β	p	B	SE	OR/β	p	B	SE	OR/β	p	B	SE	OR/β	p	B	SE	OR/β	p				
Exogenous variables																												
Age (25–45)																												
Black																												
Hispanic																												
Asian																												
Individual cues																												
Primary infertility	-.12	.02	.89	***	-.05	.02	.95		.18	.07	1.20	**	.43	.04	1.54	***	.52	.05	1.68	***	.69	.05	1.99	***	.02	.01	1.02	***
Infertile with Intent	-.11	.03	.90	***	.03	.03	1.03		.04	.07	1.04		.29	.05	1.34	**	.18	.04	1.20	***	-.15	.06	.86	*				
Would like a(nother) baby	.01	.03	1.01		.00	.03	1.00		.09	.07	1.09		.25	.04	1.28	***	.18	.05	1.20	***	.11	.06	1.12					
Never married	.26	.02	1.30	***	.02	.05	1.02		.03	.05	1.03		-.21	.08	.81	**	-.36	.09	.70	***	-.33	.11	.72	**				
Social cues																												
Friends and family have kids	.02	.02	1.02		.06	.02	1.06	**	-.14	.02	.87	*	.13	.07	1.14		.10	.07	1.11		.21	.09	1.23	*				
Infertility stigma	.06	.03	.05		-.11	.04	-.07	**	-.20	.10	-.05		.04	.04	1.04		.03	.04	1.03		.12	.05	1.13	*				
Partner encouraged	-.12	.02	.88	***	-.02	.02	.99		.12	.07	1.13		.87	.04	2.39	***	.74	.05	2.10	***	.70	.06	2.01	***				
Family encouraged	-.08	.02	.93	***	-.04	.02	.96	*	.11	.07	1.12		.57	.05	1.77	***	.53	.06	1.70	***	.53	.07	1.70	***				
Enabling conditions																												
Family income	-.47	.05	-.21	**	-.45	.05	-.18	***	.33	.16	.05	*	.06	.03	1.06	*	.12	.03	1.12	***	.09	.03	1.09	*				
Education	-.37	.13	-.06	**	-.154	.14	-.22	***	2.71	.40	.14	***	.01	.01	1.01		.02	.01	1.02	*	.01	.01	1.01					
Private health insurance	-.18	.02	.84	***	-.21	.03	.81	***	.05	.06	1.06		.18	.06	1.20	**	.16	.07	1.17	*	.25	.08	1.28	**				
Predisposing conditions																												
Importance of motherhood	-.12	.03	-.09	***	-.13	.03	-.09	***	-.01	.09	.00		.07	.04	1.07	**	.18	.05	1.20	***	.28	.06	1.32	***				
Ethical concerns	-.19	.03	.15	***	.15	.03	.11	***	.21	.08	.06	*	-.03	.04	.97		-.11	.05	.90	*	-.26	.06	.77	***				
R square													.55				.55				.54							

Odds ratios (OR) computed for categorical dependent variables. β computed for continuous dependent variables.
 * p < .05, ** p < .01, *** p < .001

set of coefficients shows the paths from Asian to mediators. Asian women do not exhibit many differences from white women with regard to variables likely to mediate between race-ethnicity and medical service use. They are more likely to report primary infertility (OR = 1.20), have somewhat higher incomes ($\beta = .05$), and have more education ($\beta = .14$) than white women. Like black and Hispanic women, Asian women have higher scores than white women on ethical concerns with treatment ($\beta = .06$). They are somewhat less likely to report that most friends and family have children (OR = .87).

The following three sets of coefficients display the effect of the exogenous variables (race-ethnicity and age) and all mediating variables on medical service use on seeing a doctor, getting tests, and receiving treatment. Age has a small, positive association with all three medical services variables. Black women were significantly less likely than white women to see a doctor (OR = .89), but not to get tests or receive treatment. Hispanic women were less likely than white women to see a doctor (OR = .87) and get tests (OR = .83), but they did not differ significantly with regard to receiving treatment. With other variables controlled, Asian women remain similar to white women in terms of receiving medical services for infertility.

Turning next to mediating variables, having primary rather than secondary infertility doubled the odds of receiving medical services for infertility. This effect increases as the level of service increases from talking to a doctor (OR = 1.54) to getting tests (OR = 1.68) to receiving treatment (OR = 1.99). Women who were infertile with intent had higher odds of talking to a doctor (OR = 1.34) and having tests (OR = 1.20) but lower odds of getting treatment (OR = .86) compared to women without intent. Women who desire a(nother) child have greater odds of talking to a doctor (OR = 1.28) and getting tests (OR = 1.20) than women who do not desire another child. Women who have never been married are less likely to see a doctor (OR = .81), get tests (OR = .70), or receive treatment (OR = .72) than women who were ever married.

Among the indicators of social cues, partner encouragement (OR = 2.39, 2.10, 2.01) and family encouragement (OR = 1.77, 1.70, 1.70) are associated with increased odds of receiving medical services at

all levels. Reporting that friends and family have children (OR = 1.23) and perceiving that infertility is stigmatized (OR = 1.13) are associated with higher odds of receiving treatment but not with lower levels of service receipt. Enabling factors are also associated with receiving medical services. Higher income (OR = 1.06, 1.12, 1.09) and having private insurance (OR = 1.20, 1.17, 1.28) are associated with higher odds of medical service use at all levels. Education (OR = 1.02) is associated with service receipt only at the level of getting tests. With regard to predisposing conditions, importance of motherhood is associated with higher odds of medical service use for all levels (OR = 1.07, 1.20, 1.32). Ethical concerns are associated with lower odds of getting tests (OR = .90) and receiving treatment (OR = .77).

Table 2 shows that some variables—primary infertility and family income, for example—are influenced by race-ethnicity and in turn influence medical service use for infertility; therefore race-ethnicity has both direct and indirect effects on medical service use. Table 3 displays the direct effects of the racial-ethnic categories on each of the three levels of service receipt as well as the indirect effects through intervening variables. Indirect effects are computed by multiplying the coefficient for the effect of race-ethnicity on the mediating variable times the coefficient for the effect of the mediating variable times medical service use for infertility. The top portion of the table displays indirect effects of the race-ethnicity variables separately for each intervening variable. The bottom three lines show the direct effects of the race-ethnicity variables on medical service use, the total indirect effects (the sum of the separate indirect effects from the upper portion of the table), and the total effects (the sum of the direct and indirect effects). All coefficients are presented in standardized form for ease of comparison.

Black women are less likely than white women to have primary infertility, partners and family members encourage treatment, and private health insurance, all of which are associated with higher likelihood of receiving medical services for infertility. Compared to white women, black women also have lower incomes and lower importance of motherhood scores, thus contributing to their lower medical service use. Black women are more likely to report never having been married, which also contributes to lower service

Table 3. Direct, Indirect, and Total Effects of Race on Receiving Infertility Services among Infertile Women (N = 2,162)

	Indirect Effect of Black				Indirect Effect of Hispanic				Indirect Effect of Asian				
	Doctor	Tests	Treatment		Doctor	Tests	Treatment		Doctor	Tests	Treatment		
	Std p	Std p	Std p		Std p	Std p	Std p		Std p	Std p	Std p		
Individual cues													
Primary infertility	-.02 ***	-.03 ***	-.04 ***		-.01	-.01	-.01		.01 *	.01 **	.02 *		.02 *
Infertile with intent	-.01 **	.01 **	.01 *		.00	.00	.00		.00	.00	.00		.00
Would like a(nother) baby	.00	.00	.00		.00	.00	.00		.00	.00	.00		.00
Never married	-.03 **	.04 ***	-.04 **		.00	.00	.00		.02 **	.00	.00		.00
Social cues													
Friends and family have kids	.00	.00	.00		.00	.00	.01		.00	.00	.00		.00
Infertility stigma	.00	.00	.00		.00	.00	-.01		.00	.00	.00		.00
Partner encouraged	-.04 ***	-.04 ***	-.04 ***		-.01	-.01 *	.00 *		.02	.01	.01		.01
Family encouraged	-.02 ***	-.02 ***	-.02 ***		-.01 *	-.01 **	-.01 **		.01	.01	.01		.01
Enabling conditions													
Family income	-.01 *	-.01 *	-.02 *		-.01 *	-.02 **	-.02 *		.00	.00	.00		.00
Education	.00	.00	.00		-.01	-.01 *	.00		-.01	.01 *	.00		.00
Private health insurance	-.01 **	-.01 *	-.02 **		-.02 **	-.02 **	-.02 **		.00	.00	.00		.00
Predisposing conditions													
Importance of motherhood	.00	-.01 **	-.02 *		.00	-.01 **	-.01 **		.00	.00	.00		.00
Ethical concerns	.00	.00	-.02 ***		.00	-.01	-.01 **		.00	.00	-.01 *		-.01 *
Direct effects	-.05 *	-.03	-.06		-.05 *	-.05 **	-.04		-.04	-.01	-.01		-.01
Total indirect effects	-.15 ***	-.17 ***	-.18 ***		-.06 ***	-.08 ***	-.10 ***		.00 *	.04 *	.03		.03
Total effects	-.20 ***	-.20 ***	-.24 ***		-.11 ***	-.15 ***	-.14 ***		.00	.03	.02		.02

* p < .05 ; ** p < .01 ; *** p < .001

use. They have lower levels of education than white women, which is associated with lower odds of having tests. Black women are less likely to be infertile with intent, and infertility with intent is associated with higher likelihood of talking to a doctor or having tests but lessens the chances of receiving treatment. Black women are also more likely than white women to have ethical concerns about treatment—another factor contributing to black women having lower odds than white women of both getting tests and receiving treatments. The combined indirect effects for black women contribute more to the total effect of all levels of receiving medical services for infertility than the direct effect of race-ethnicity. For example, the standardized indirect effect for black compared to white women on seeing a doctor is .15, and the direct effect is $-.05$.

As with black women, we observe indirect effects on all levels of medical service use for family encouragement, family income, and private insurance among Hispanic women compared to white women. There are also indirect effects of Hispanic compared to white women on having tests through education and indirect effects on receiving treatment through partner encouragement and ethical concerns. Although the total indirect effects for Hispanic women are not as large as for black women, they are still larger than the direct effects ($-.06$ compared to $-.05$ for seeing a doctor). Asian women present a very different picture. For Asian women, the direct, total indirect, and total effects on receiving medical services for infertility show only slight differences from the patterns for white women.

Discussion and Conclusion

Examining direct and indirect paths from race-ethnicity to medical service use for infertility provides important insights into racial/ethnic reproductive stratification in the United States. Because the NSFB data set includes measures of all key concepts in medical helpseeking models, we are able to unpack why black and Hispanic women are less likely than white and Asian women to seek medical help for infertility. This is an important contribution to understanding the perplexing pattern of overrepresentation of infertility among black and Hispanic

women and under-representation of these same groups among those seeking medical help. Our focus on mediating variables reveals pathways from race-ethnicity to receipt of services through several variables that also differ by race-ethnicity. The enabling conditions of income, education, and private insurance partially mediated but did not fully account for the relationship between race-ethnicity and receiving medical services for infertility. Once controls were added, the effect for black women compared to white women disappeared at the levels of having tests or receiving treatment but not for talking to a doctor. After including control variables, the effect for Hispanic compared to white women disappeared at the levels of receiving treatment but not at the level of talking to a doctor or having tests. For both black and Hispanic women, individual cues, social cues, enabling conditions, and predisposing conditions all contribute to racial/ethnic disparities in medical service use for infertility.

Thus, the pathways from race-ethnicity to medical service use are multiple and complex. Black and Hispanic women are less likely than white women to receive services in part because they have less access to treatment, but also because they are less likely to have primary infertility, are less likely to think of themselves as having *tried* to become pregnant, receive less support for treatment from family and friends, place less value on motherhood as an identity, and have greater ethical concerns about infertility treatment. Contrary to the common presumption that access to resources fully explains racial stratification in medical service use, we find that an economic explanation alone is too simplistic; it is necessary to incorporate attitudinal, social, and interpersonal pathways connecting race-ethnicity and medical service use.

In general we found support for links between race-ethnicity and medical service use for infertility that were suggested by prior helpseeking research. Black women are more likely than white women to experience secondary infertility and less likely to see themselves as having tried to become pregnant, presumably because of differing norms concerning the importance of pregnancy planning. It is not surprising that black and Hispanic women are less likely to have ever been married than white or Asian women. That Hispanic women are more likely and Asian women less likely to report that most of their friends

and family have children could reflect both family-size norms and residential patterns. The finding that Hispanic and Asian women report less of a sense that infertility is stigmatizing compared to white women is surprising in light of Szkupinski-Quiroga's (2007) recent ethnographic research. We anticipate needing to do in-depth interviews to explain this finding.

Black women report less encouragement for treatment from family and friends than white women, and this is consistent with our expectations. This pattern also corresponds with the idea of lower levels of trust in medicine and lower levels of faith in technological solutions to the problem of infertility (White et al. 2006) among black compared to white women. Consistent with other studies, black and Hispanic women have lower incomes, less education, and are less likely to have private health insurance than white women. The finding of lower levels of importance of motherhood among black and Hispanic women is similar to results from the full sample of the National Survey of Fertility Barriers (McQuillan et al. 2008). Further research needs to assess whether the construction of the importance of motherhood scale or actual levels of importance of motherhood account for these reported differences by race-ethnicity. The fact that black, Hispanic, and Asian women all have greater ethical concerns about assisted reproductive technology for infertility than white women also begs for further study.

For neither black nor Hispanic women are the effects of race-ethnicity on all service levels fully mediated by the variables we were able to include in this analysis. Even after we control for other variables, compared to white women, black women remain less likely to see a doctor, and Hispanic women remain less likely to talk to a doctor or to get tests. These findings are inconsistent with the work of Chandra and Stephen (2010), who found that racial/ethnic differences in receipt of services disappeared once SES was included in the analysis. There are several potential reasons for this contrast. Our operational definition of infertility is different: They include only women who are currently having regular intercourse without conception. Our treatment categories were also defined differently. For example, they did not distinguish between talking to a doctor and having tests, and we did not distinguish between different

types of treatment. Furthermore, the analysis strategies employed in the two studies differed; Chandra and Stephen compared each treatment group to those receiving no services, but we compared each service level to all lower levels. Finally, only our data included social cues and predisposing factors. Even with these sample and analysis differences, we also find, as Chandra and Stephen do, that the effects of race-ethnicity on medical service use for infertility is primarily indirect.

We contribute to research on infertility helpseeking by including three levels of services – talking to a doctor, getting tests, and receiving treatment. Separating levels of treatment reveals important nuances about race-ethnicity. For black and Hispanic women, the direct effect of race-ethnicity is significant at lower levels of service provision. Thus, it appears that race-ethnicity has a stronger impact at the entry level and that, once women become involved with the infertility helpseeking process, the direct effects of race-ethnicity decrease. Likewise, the effects of wanting another child, family encouragement, and partner encouragement decrease by level of service, again suggesting that entry into the process is a key site for disparities. The effects of the importance of primary infertility, importance of motherhood, and ethical concerns, however, increase with level of service, suggesting that individual attitudes and concerns become more important as the level of service increases. Having friends and family with children and seeing infertility as stigmatizing become significant only at the level of receiving treatment, again suggesting that the individual salience of infertility increases as the treatment process proceeds.

Prior to this study, there was little information on the infertility treatment experiences of Asian women. We therefore provide an important corrective to previous research on reproductive racial stratification in the United States. We do not find differences in medical service use for infertility among Asian and white women. This is consistent with literature showing that Asian Americans have relatively high levels of SES and assimilation (Lee and Edmonston 2005; U.S. Census Bureau 2011). That there are few differences between Asian and white women in mediating variables likely explains why infertility medical service use is similar for these two groups.

Cross-sectional data prevent strong conclusions about temporal ordering. Additionally, central concepts were sometimes measured at the time of the infertility episode and sometimes at the time of the interview. We know, for example, that higher ethical concerns are associated with lower levels of medical service use, but we cannot decisively conclude that ethical concerns cause women to forgo medically appropriate services. Alternatively, women may have developed ethical concerns after seeking medical services.

It is possible that we would have found differences between Asians and other groups if we had been able to further break down the Asian group. For example, Chinese immigrants may be quite different from Indian immigrants, and women whose families have been in the United States for two generations probably differ from women recently arriving. Similar heterogeneity exists among Hispanic women. Although our sample is quite large, the numbers of cases in specific politically constructed pan-ethnic groups is not sufficient for such detailed analyses.

In addition, more work is necessary to better understand the role of factors that we were not able to measure, such as discrimination by health care institutions, lack of information about treatment options, lack of referrals, medical mistrust, communication barriers, and cultural biases against treatment. Still, because we have been able to uncover a variety of pathways connecting race-ethnicity to infertility medical service use, because we have been able to look at various levels of service, and because we have been able to include Asian women in our analysis, this analysis makes a valuable contribution to the understanding of racial/ethnic disparities in infertility medical service use.

Racial/ethnic disparities in infertility service use persist, thus justifying the use of the term *stratified reproduction*. Much of the work on stratified reproduction is ethnographic. These studies can uncover perceptions of discrimination and other institutional obstacles to social action, but they are limited in their generalizability. The NSFB survey is more representative but unable to detect nuances important to understanding the processes of stratified reproduction. We provide evidence consistent with the theory that infertility treatment is racially stratified, but it is difficult to fully document the barriers to treatment that exist at

the micro- and meso-levels via survey research. Read in conjunction with other large representative samples and ethnographic work on race-ethnicity, class, and infertility, our study sheds further light on racially stratified reproduction.

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