

Women Surgeons in the New Millennium

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Background: Women are increasingly entering the surgical profession.

Objective: To assess professional and personal/family life situations, perceptions, and challenges for women vs men surgeons.

Design: National survey of American Board of Surgery-certified surgeons.

Participants: A questionnaire was mailed to all women and men surgeons who were board certified in 1988, 1992, 1996, 2000, or 2004. Of 3507 surgeons, 895 (25.5%) responded. Among these, 178 (20.3%) were women and 698 (79.7%) were men.

Results: Most women and men surgeons would choose their profession again (women, 82.5%; men, 77.5%; $P=.15$). On multivariate analysis, men surgeons (odds ratio [OR], 2.5) and surgeons of a younger generation (certified in 2000 or 2004; OR, 1.3) were less likely to favor part-time work opportunities for surgeons. Most

of the surgeons were married (75.6% of women vs 91.7% of men, $P<.001$). On multivariate analysis, women surgeons (OR, 5.0) and surgeons of a younger generation (OR, 1.9) were less likely to have children. More women than men surgeons had their first child later in life, while already in surgical practice (62.4% vs 32.0%, $P<.001$). The spouse was the offspring's primary caretaker for 26.9% of women surgeons vs 79.4% of men surgeons ($P<.001$). More women surgeons than men surgeons thought that maternity leave was important (67.8% vs 30.8%, $P<.001$) and that child care should be available at work (86.5% vs 69.7%, $P<.001$).

Conclusions: Women considering a surgical career should be aware that most women surgeons would choose their profession again. Strategies to maximize recruitment and retention of women surgeons should include serious consideration of alternative work schedules and optimization of maternity leave and child care opportunities.

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THE INCREASING PRESENCE OF women in the field of surgery during the past 3 decades has resulted in a diverse surgical workforce that is more representative of the society it serves.¹ This trend follows the evolution that has taken place in other areas of society, where women have entered many nonmedical professional fields since the end of World War II.² In those nonmedical fields, considerable efforts have been made to better understand and accommodate women's specific needs and expectations. In the medical field, a career in surgery has significant lifestyle implications: the profession is associated with high degrees of patient acuity, significant on-call responsibility, and irregular work hours, all requiring a significant commitment of personal time. The extent to which the surgical workplace has evolved to accommodate women and their role in family life is unknown to

the public, in general, and to the upcoming generation of women physicians, in particular. This is an important issue reaching far beyond each woman surgeon. For instance, women in surgery remain highly visible, as they still constitute only approximately 14% of the surgical workforce in the United States.¹ They serve, therefore, as important role models, influencing those women medical students who are considering a surgical career.³

A better understanding of the issues that women surgeons face when integrating their family and professional lives would provide professional societies and health care policy makers with the opportunity to intervene and to address issues and obstacles that (1) keep women from entering surgery and (2) contribute to attrition among women surgeons. To our knowledge, there are no data on a large-scale national level with which to begin dissecting these issues.

Table 1. Respondent Demographics According to Sex

Characteristic	Women		Men		P Value
	No. (%)	95% CI	No. (%)	95% CI	
Total No. of respondents ^a	178 (20.3)	...	698 (79.7)	...	
Age, mean, y (SD)	43.6 (5.4)	...	46.1 (6.0)	...	<.001
Ethnicity					
White	145 (81.5)	75.8-87.2	604 (87.2)	84.7-89.6	.06
Latino/Hispanic	8 (4.5)	1.5-7.5	30 (4.3)	2.8-5.8	.92
African American	3 (1.7)	0-3.6	9 (1.3)	0.5-2.1	NA
Asian/Pacific Islander	16 (9.0)	4.8-13.2	41 (5.9)	4.2-7.7	.14
Other	6 (3.4)	0.7-6.0	9 (1.3)	0.5-2.1	NA
Total	178 (20.3)	17.8-23.1	693 (79.7)	76.9-82.2	...
Marital status					
Married	133 (75.6)	69.2-81.9	637 (91.7)	89.6-93.7	<.001
Stable life partner	7 (4.0)	1.1-6.9	8 (1.2)	0.4-1.9	NA
Separated	0	0	6 (0.9)	0.2-1.6	NA
Divorced	13 (7.4)	3.5-11.3	27 (3.9)	2.4-5.3	.04
Widowed	0	0	3 (0.4)	0.1-0.9	NA
Single	23 (13.1)	8.1-18.0	14 (2.0)	1.0-3.1	<.001
Total	176 (20.2)	17.5-22.9	695 (79.8)	77.1-82.5	...
Respondents with children	111 (63.8)	56.7-70.9	633 (91.3)	89.2-93.4	<.001
Respondents without children	63 (36.2)	29.1-43.3	60 (8.7)	6.6-10.8	
Total	174 (20.0)	17.4-22.7	693 (80.0)	77.3-82.6	...
ACS member	167 (95.4)	92.3-98.5	633 (92.5)	90.6-94.5	.18
Non-ACS member	8 (4.6)	1.5-7.7	51 (7.5)	5.5-9.4	
Total	175 (20.3)	17.7-23.1	684 (79.6)	76.9-82.3	...
AWS member	103 (62.0)	54.7-69.4	0	0	<.001
Non-AWS member	63 (38.0)	30.6-45.3	698 (100.0)		
Total	166 (19.2)	16.6-21.8	698 (80.8)	78.2-83.4	...
ABS certification year					
1988	15 (8.6)	4.4-12.7	130 (18.8)	15.9-21.7	.001
1992	26 (14.9)	9.6-20.1	159 (22.9)	19.8-26.1	.02
1996	35 (20.0)	14.1-25.9	144 (20.8)	17.8-23.8	.93
2000	40 (22.9)	16.6-29.1	110 (15.9)	13.2-18.6	.02
2004	59 (33.7)	26.7-40.7	150 (21.6)	18.6-24.7	.001
Total	175 (20.1)	17.5-22.8	693 (79.9)	77.2-82.5	...
Practice setting					
Solo practice	38 (21.3)	15.3-27.4	144 (20.7)	17.8-23.8	.85
Group practice	79 (44.4)	37.1-51.7	376 (54.1)	50.5-58.0	.02
Health maintenance organization	6 (3.4)	0.7-6.0	14 (2.0)	1.0-3.1	NA
University	37 (20.8)	14.8-26.7	118 (17.0)	14.2-19.8	.23
Veterans Administration/US government hospital	8 (4.5)	1.5-7.5	15 (2.2)	1.1-3.2	NA
City/county hospital	1 (0.6)	0.1-1.7	12 (1.7)	0.8-2.7	NA
Other	9 (5.1)	1.8-8.3	16 (2.3)	1.2-3.4	NA
Total	178 (20.3)	17.7-23.1	695 (79.7)	76.9-23.3	...
Practice location					
Rural practice	36 (20.3)	14.4-26.3	203 (29.8)	26.4-33.2	.01
Urban practice	141 (79.7)	73.7-85.6	478 (70.2)	66.8-73.6	
Total	177 (20.6)	17.9-23.3	681 (79.4)	76.7-82.1	...

Abbreviations: ABS, American Board of Surgery; ACS, American College of Surgeons; AWS, Association of Women Surgeons; CI, confidence interval; NA, not applicable.

^aTotal number of respondents for individual questions may be less than the overall number of study participants owing to incomplete responses.

To obtain much needed information on women surgeons' professional and personal lives, we conducted a national survey of American Board of Surgery (ABS)-certified surgeons who completed their training in the past 20 years. To better define and characterize unique challenges posed by a surgical career for women, we also evaluated men surgeons' attitudes regarding these issues.

METHODS

A questionnaire was distributed to surgeons of both sexes across surgical specialties to assess professional and family life situ-

ations and attitudes. Open- and closed-ended questions, including 5-point Likert scales, were used. One hundred surgeons were randomly selected to pilot test the survey.

The final questionnaire was mailed via first-class mail to all surgeons in the United States who had obtained ABS certification in 1988, 1992, 1996, 2000, or 2004. Of the 4005 potential respondents, 498 could not be reached owing to an insufficient address. A follow-up letter was mailed to nonrespondents 8 weeks after the first mailing. All responses were confidential and at no time were the respondents of returned questionnaires reidentified by name. This study was approved by the UC Davis Institutional Review Board. The survey also addressed areas other than those that are the focus of the present article. The responses per-

Table 2. Part-time and Full-time Work Experience According to Sex

Part- and Full-time Work Experience	Women (n=178)		Men (n=698)		P Value
	No. (%) ^a	95% CI	No. (%) ^a	95% CI	
Currently practicing clinical surgery					
Full-time	167 (93.8)	90.3-97.4	682 (98.4)	97.5-99.3	<.001
Part-time	11 (6.2)	2.6-9.7	11 (1.6)	0.7-2.5	
Total	178 (20.3)	17.8-23.1	693 (79.7)	76.9-82.2	
Ever worked part-time as a clinical surgeon					
No	162 (91.5)	87.4-95.6	660 (96.8)	95.4-98.1	.002
Yes	15 (8.5)	4.4-12.6	22 (3.2)	1.9-4.6	
Total	177 (20.6)	17.9-23.3	682 (79.4)	76.7-82.1	

Abbreviation: CI, confidence interval.

^aTotal number of respondents for individual questions may be less than the overall number of study participants owing to incomplete responses.

taining to these other areas (including overall satisfaction, professional responsibilities, reimbursement issues, and job impact on personal life) are reported and discussed elsewhere.⁴

Data were summarized with descriptive statistics and univariate analyses. Proportions include 95% confidence intervals; their significance was assessed with the Pearson χ^2 test. Mean values were compared using *t* tests, and median values were compared using the Westenberg-Mood median test.

We performed 2 logistic regression multivariate analyses to evaluate potential risk factors for (1) disagreement with the statement “surgeons should have more part-time work opportunities with call cross-coverage by other surgeons” and (2) absence of biological or adopted children. Covariates for these multivariate analyses included sex (men vs women), year of ABS certification (1988, 1992, or 1996 vs 2000 or 2004), marital status (married/stable life partner vs not married/no stable life partner), satisfaction with reimbursement (yes vs no), clinical practice setting (university vs nonuniversity), practice location (rural vs urban), surgical specialty (surgical subspecialty vs general surgery), and children (no vs yes [for analysis 1 only]).

Responses to questions rated along the Likert scale continuum were collapsed into binary groups for comparative purposes. Neutral and lower (negative) responses were combined into a single group, whereas responses that rated higher (positive) than neutral were pooled into the comparative group. For analysis of the questions of whether respondents would recommend the surgical profession to women or men and whether they would choose to become a surgeon again, we categorized “yes” and “yes with some reservation” answers as a yes response and compared them with the “not sure” and “no” answers, which were categorized as a no response.

All statistical analyses were performed using SAS version 9.1.3 (SAS Institute, Cary, North Carolina) and SPSS version 14.0.1 (SPSS Inc, Chicago, Illinois).

RESULTS

A total of 895 surgeons responded (25.5% response rate). Among these, 178 (20.3%) were women and 698 (79.7%) were men (of note, 14.2% of the population that was sampled were women). Compared with men, women were more likely to be single or divorced, more frequently childless, and more likely to work in an urban practice (**Table 1**).

General surgery was the most common specialty for both sexes (women, 39.3%; men, 46.7%; $P=.08$). Significantly more women than men had specialized in breast surgery (20.2% vs 1.3%, $P=.002$), and fewer women than

men respondents had specialized in vascular surgery (2.9% vs 10.3%, $P=.002$). We found no sex differences for all other surgical subspecialties.

For the actual number of hours worked per week, we observed a statistically significant sex difference (median: women, 60 hours; men, 65 hours; $P<.001$). For the ideal number of work hours per week, we observed no sex difference (median for women and men surgeons: 50 hours).

Significantly more women than men surgeons had ever practiced or were currently practicing surgery on a part-time basis (**Table 2**). The absolute number of those currently or previously involved with part-time practice, however, was low (Table 2). Significantly more men (55.5%) than women (33.3%) respondents disagreed with the statement “surgeons should have more part-time work opportunities with call cross-coverage by other surgeons” ($P<.001$). Our multivariate analysis showed that male sex and being of a younger generation (ABS certification in 2000 or 2004) were independent risk factors for disagreement with more part-time work opportunities (**Table 3**). Significantly more men (71.9%) than women (60.2%) respondents disagreed with the statement “surgeons should have more full-time, shift work opportunities” ($P<.001$).

Most women and men surgeons would choose to become surgeons again (women, 82.5%; men, 77.5%; $P=.15$). Overall, 83.5% of women vs 61.3% of men respondents would recommend surgery to other women ($P<.001$). With regard to recommending surgery to men, 88.6% of women vs 79.5% of men would do so ($P=.005$).

At home, women surgeons were considerably less likely to have a spouse who was a homemaker than were men surgeons (women, 9.4%; men, 56.3%, $P<.001$) (**Table 4**). Also, more women than men surgeons were married to another surgeon or to a professional career person (Table 4).

Fewer women than men surgeons had children (63.8% vs 91.3%, $P<.001$) (Table 1). When comparing the women of the older generations (ABS certification in 1988, 1992, or 1996) and the women of the younger generations (ABS certification in 2000 or 2004) with their respective male counterparts, significantly fewer women surgeons had children (with the absolute intergender difference for having children being 22.9% and 28.7% for the older and younger ABS certification groups, respectively) (**Table 5**). Our multivariate analysis showed that

Table 3. Multivariate Analysis: Risk Factors for Surgeons Who Disagree With the Statement "Surgeons Should Have More Part-time Work Opportunities"

Risk Factor	P Value	Odds Ratio (95% CI)
Sex		
Women		1 [Reference]
Men	<.001	2.5 (1.7-3.7)
Year of ABS certification		
1988, 1992, or 1996		1 [Reference]
2000 or 2004	.04	1.3 (1.0-1.8)
Marital status		
Married/stable life partner		1 [Reference]
Not married/no stable life partner	.85	0.9 (0.6-1.6)
Reimbursement		
Satisfied with reimbursement		1 [Reference]
Dissatisfied with reimbursement	.72	0.9 (0.7-1.3)
Clinical practice setting		
University		1 [Reference]
Nonuniversity	.41	0.9 (0.6-1.3)
Practice location		
Rural		1 [Reference]
Urban	.09	1.3 (0.9-1.8)
Surgical specialty		
Subspecialty		1 [Reference]
General surgery	.93	1.1 (0.8-1.5)
Children		
No		1 [Reference]
Yes	.46	1.2 (0.7-1.9)

Abbreviations: ABS, American Board of Surgery; CI, confidence interval.

female sex and being of the younger generation were independent risk factors for being childless (**Table 6**).

Birth or adoption of the first child had occurred most frequently during surgical residency for men surgeons (48.7%) and during surgical practice for women surgeons (62.4%) (**Table 7**). For women surgeons, the pri-

Table 6. Multivariate Analysis: Risk Factors for Surgeons Without Biological or Adopted Children

Risk Factor	P Value	Odds Ratio (95% CI)
Sex		
Men		1 [Reference]
Women	<.001	5.0 (3.2-7.7)
Year of ABS certification		
1988, 1992, or 1996		1 [Reference]
2000 or 2004	.002	1.9 (1.2-3.0)
Reimbursement		
Satisfied with reimbursement		1 [Reference]
Dissatisfied with reimbursement	.93	0.9 (0.6-1.6)
Clinical practice setting		
University		1 [Reference]
Nonuniversity	.48	0.8 (0.4-1.3)
Practice location		
Rural		1 [Reference]
Urban	.39	1.3 (0.7-2.3)
Surgical specialty		
Subspecialty		1 [Reference]
General surgery	.21	1.4 (0.9-2.4)

Abbreviations: ABS, American Board of Surgery; CI, confidence interval.

Table 4. Spousal Status

Occupation of Spouse	Women (n=178)		Men (n=698)		P Value
	No. (%) ^a	95% CI	No. (%) ^a	95% CI	
Homemaker	13 (9.4)	4.5-14.3	355 (56.3)	52.4-60.1	<.001
Professional career person	60 (43.5)	35.2-51.7	146 (23.1)	19.8-26.4	<.001
Physician	25 (18.1)	11.7-24.5	88 (13.9)	11.2-16.6	.21
Surgeon	26 (18.8)	12.3-25.4	17 (2.7)	1.4-4.0	<.001
Other	14 (10.1)	5.1-15.2	25 (4.0)	2.4-5.5	.003
Total	138 (17.9)	15.2-20.7	631 (80.1)	79.3-84.8	...

Abbreviation: CI, confidence interval.

^aTotal number of respondents for individual questions may be less than the overall number of study participants owing to incomplete responses.

Table 5. Surgeon Sex, Children, and ABS Certification Period

ABS Certification and Presence or Absence of Children	Women (n=178)		Men (n=698)		P Value
	No. (%) ^a	95% CI	No. (%) ^a	95% CI	
ABS certified in 1988, 1992, or 1996					
No children	24 (28.9)	20.3-40.0	28 (6.0)	5.2-10.0	<.001
≥1 Child	59 (71.1)	62.7-81.9	435 (94.0)	90.8-95.4	
Total	83 (15.2)	12.2-18.2	463 (84.8)	81.8-87.8	...
ABS certified in 2000 or 2004					
No children	37 (42.0)	33.9-54.7	30 (13.3)	4.2-8.7	<.001
≥1 Child	51 (58.0)	47.6-68.3	196 (86.7)	38.0-47.1	
Total	88 (28.0)	23.1-33.0	226 (72.0)	67.0-76.9	...

Abbreviations: ABS, American Board of Surgery; CI, confidence interval.

^aTotal number of respondents for individual questions may be less than the overall number of study participants owing to incomplete responses.

Table 7. Timing of Birth or Adoption of First Child

Educational or Professional Level at Birth or Adoption of First Child	Women (n=111)		Men (n=633)		P Value
	No. (%) ^a	95% CI	No. (%) ^a	95% CI	
College	2 (1.8)	0.0-4.3	9 (1.5)	0.5-2.3	NA
Medical school	3 (2.8)	0.0-5.7	61 (10.0)	7.3-11.9	.02
Residency	30 (27.5)	18.8-35.3	298 (48.7)	43.2-51.0	<.001
Fellowship	5 (4.6)	0.6-8.4	46 (7.5)	5.2-9.3	.27
Surgical practice	68 (62.4)	52.2-70.3	196 (32.0)	27.4-34.6	<.001
Other	1 (0.9)	0.0-2.7	2 (0.3)	0.0-0.8	NA
Total	109 (15.1)	12.5-17.7	612 (84.9)	84.3-87.5	...

Abbreviations: CI, confidence interval; NA, not applicable.

^aTotal number of respondents is less than the total number of study participants with children owing to incomplete responses.

Table 8. Primary Caretaker of Children

Primary Child Caretaker	Women (n=111)		Men (n=633)		P Value
	No. (%) ^a	95% CI	No. (%) ^a	95% CI	
Spouse/partner/significant other	28 (26.9)	18.4-35.4	490 (79.4)	76.2-82.6	<.001
Family member	7 (6.7)	1.9-11.5	13 (2.1)	1.0-3.2	NA
Friend	2 (1.9)	0-4.6	0	0	NA
Employer day care	6 (5.8)	1.3-10.3	2 (0.3)	0-0.8	NA
Professional in-home babysitter	42 (40.4)	31.0-49.8	65 (10.5)	8.1-13.0	<.001
Other day care	12 (11.5)	5.4-17.7	20 (3.2)	1.8-4.6	NA
None	7 (6.7)	1.9-11.5	27 (4.4)	2.8-6.0	NA
Total	104 (14.4)	12.0-17.2	617 (85.6)	84.2-89.2	...

Abbreviations: CI, confidence interval; NA, not applicable.

^aTotal number of respondents is less than the total number of study participants with children owing to incomplete responses.

mary caretaker of the offspring was most often a professional in-home babysitter (40.4%), whereas for men surgeons, it was most often the spouse or significant other (79.4%; $P < .001$) (**Table 8**). Most surgeons of both sexes had no child care facility available at the workplace (women, 68.8%; men, 65.1%; $P = .35$). However, most surgeons, and women more so than men, believed that a child care facility should be available at work (86.5% vs 69.7%, $P < .001$). Most women and men surgeons thought that the cost of running a child care facility at work should be covered by both the employer and the employee (76.4% vs 72.3%, $P = .27$). The satisfaction rate with current or past child care arrangements was comparable for both sexes (83.1% vs 85.6%, $P = .49$).

The median length of maternity leave that had effectively been taken was 6 weeks (interquartile range, 4-8 weeks). There was no significant difference in opinion regarding the ideal duration of maternity leave as recommended by women vs men surgeons (median [interquartile range]: women, 8 weeks [6-12 weeks]; men, 7 weeks [6-12 weeks]; $P = .52$). Nonetheless, significantly more women than men surgeons rated maternity leave as important (67.8% vs 30.7%, $P < .001$). Also, significantly more women than men surgeons rated paternity leave as important (51.5% vs 26.7%, $P < .001$).

COMMENT

Much has been written about women surgeons' challenges in their profession.^{3,5,15} However, a closer look at

these studies and editorials reveals that there has been little formal research investigating issues faced by currently practicing women surgeons on a large-scale national level across subspecialties, practice types, practice settings, and demographic groups. Some of these publications have focused on perceptions of women medical students about a surgeon's career and lifestyle.^{3,13} Others limited their scope to members of surgical subspecialties or specific demographic subsets of surgeons.^{3,9-11,15} Academic women surgeons have also been studied, yet they constitute only a small proportion of the female surgical workforce.^{7,11}

We, therefore, conducted a national survey across a wide demographic spectrum and all surgical specialties. Our respondent pool included more than 20% women surgeons, most with children, and was demographically diverse. A representative majority practiced in a non-university setting, and more than one fourth of all respondents practiced in a rural location. Given that surgery has been a highly men-dominated field in which policies (eg, vacation time) and expectations (eg, regarding work hours) have been primarily set by the perceptions and attitudes of men surgeons, we also surveyed men surgeons.¹²

It is of importance that, although surgeons of both sexes thought that they worked too many hours, most women and men surgeons indicated that they would choose the surgical profession again.

When gauging another, albeit indirect, measure for professional fulfillment, we noted high rates of recommen-

ation of the surgical profession by men and women surgeons to others. The observation, however, that significantly fewer men than women would recommend the surgical profession to women warrants further research to determine the potential underlying causes for this finding (eg, paternalistic attitudes, traditional family views).

Women were more strongly in favor of more part-time work opportunities for surgeons. Perhaps this is due to the fact that more women than men surgeons were married to other surgeons or professionals (rather than to a homemaker) and that more women had their first child while in surgical practice. Women surgeons were also less likely to have a spouse who was the primary caretaker of the children. Earlier studies also suggested that women surgeons spend more time on family care responsibilities than their male colleagues.^{5,7} Accordingly, in our study, most women who had ever worked part-time had done so for “parenting” reasons.

Also, according to our multivariate analysis, the younger generation of surgeons was less likely to favor more part-time work opportunities for surgeons. This finding may a priori be surprising as “generation X” (born between 1965 and 1980) has been characterized as placing more emphasis on lifestyle.¹⁶ Perhaps the increasing debt burden of surgeons who recently joined the ranks of the profession could explain their greater affinity for full-time work.¹⁷ The older generation of surgeons may have favored part-time work opportunities owing to “burnout” or, conversely, owing to an already accomplished career.

In a multivariate analysis, female sex was an independent risk factor for being childless. For all surveyed generations, there was an at least 20% (absolute) difference between the proportion of women vs men surgeons without children. For those women surgeons without children, the desire to have children may have been present at the beginning of a surgical career but may have succumbed to the pressures and realities of the surgical work life or may have been unfulfilled due to infertility caused by advanced maternal age.¹⁸ Alternatively, our observations could be explained by the possibility that only women less interested in having children entered the surgical profession. The finding that being part of the younger generation was also an independent risk factor for being childless at the time of the survey could be owing to the younger surgeons delaying their childbearing (“time-lag effect”); that is, they had not yet had their children but were still planning to do so. Or, the younger generation may have an intrinsically lower interest in having children.¹⁶ Most women surgeons who chose to have children, however, did so only after having entered surgical practice. Our study results thus strongly suggest a major relation among a surgical career, sex, and childbearing, with respect to the presence of children to begin with, and, if present, the timing of childbearing.

We also observed a significant difference in the importance attached to maternity leave when comparing women and men surgeons. There are at least 2 potential explanations for this finding. First, according to our study results, most men surgeons had a spouse who was a homemaker (and thus maternity leave was not an issue). Second, based on the demographics of the surgical profession (with nearly 85% of all surgeons being male), relatively few men

were ever exposed to childbearing female colleagues at work.¹ The fact that women, who are a growing part of the surgical workforce, ranked maternity leave as highly important warrants further discussion by all stakeholders (surgeons, employers, professional organizations, and society at large). Opinions about paternity leave illustrated the same sex imbalance. Methodologically, it is, however, difficult to precisely study paternity leave, as this entity represents a wide spectrum of arrangements (including unpaid leave of absence, paid leave of absence, vacation time, flexible working hours).

Most respondents of both sexes thought that child care facilities should be offered at work. In general, such facilities effectively decrease commuting time, reduce stress, and may ultimately facilitate recruitment and retention of women and men surgeons. The importance of this concept has been recognized and translated into practice at some institutions. For instance, 1 large leading health care system in the United States now provides child care facilities at work that are available during extended hours and even for sick children.¹⁹ The importance of child care facilities at work was underscored by both sexes’ opinion that the expenses related to workplace child care facilities should be covered by *both* employees and employers.

As is the case for all survey-based studies, our analysis may have been limited by several potential biases. First, respondents may have felt compelled to give socially or professionally desirable answers (“yeah-saying”) and may have found it difficult to freely admit to negative feelings and perceptions. This may be in part due to the significant investment in lifetime hours and financial costs for their training. Second, our study may have been subjected to (self-)selection bias as participants represent a self-selected group of surgeons. Those who had negative experiences with their careers and family lives may have been more likely to respond because they may have perceived our survey as a mechanism for venting their frustration and for effecting change. Conversely, our respondent pool may overrepresent those who were particularly positive about the profession and who were interested in sharing their perceptions. Third, our study may have been subjected to nonresponse bias (in which respondents differ from nonrespondents with respect to key variables). In our study, nonrespondents also included surgeons who had left the field and did not maintain contact with professional organizations. Our response rate might at first glance imply the presence of a strong nonresponse bias. The recruitment of physicians (vs nonphysicians) as survey participants, however, is documented in the literature as difficult to begin with, particularly for anonymous studies.²⁰ Furthermore, recently conducted anonymous, national surveys among surgeons yielded response rates in the 20.6% to 32.7% range—consistent with our study’s response rate.^{17,21,22} More important, Asch et al²⁰ noted that a survey’s absolute response rate is at best an indirect indication of the extent of nonresponse bias (ie, surveys with low response rates may still provide a representative sample of the population of interest and surveys with high response rates may not).

What are the significant implications of our findings? First, it is important for clinical surgical and institutional leaders to know that the women in their work-

force are just as likely to enjoy their work as their male counterparts. Second, in surgery, in line with the development in other professional fields, more thought should be given to alternative work organization models, including the option of temporary or permanent part-time work opportunities. This is an important aspect in an age in which surgery competes directly with other, more lifestyle-oriented medical specialties among medical students.¹⁶ Third, according to our respondents, the need for accommodating a woman surgeon's obligation toward the children in the early postpartum period is real, and consistent maternity leave policies across departments and institutions should be strongly considered. Fourth, availability of child care facilities at work should be viewed as an important need for surgeons of both sexes.

In conclusion, most women surgeons would choose the surgical profession again. This highly positive perception should be pointed out to women considering a surgical career. To foster realistic expectations among medical students, the rewarding and challenging aspects of the surgical profession must be pointed out.²³ Finally, our study results suggest that maximizing recruitment and retention of women surgeons will include giving serious consideration to alternative work schedules and optimization of maternity leave and child care opportunities.

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REFERENCES

1. Lynge DC, Larson EH, Thompson MJ, Rosenblatt RA, Hart LG. A longitudinal analysis of the general surgery workforce in the United States, 1981-2005. *Arch Surg.* 2008;143(4):345-351.
2. Friedan B. *The Feminine Mystique*. New York, NY: WW Norton; 1963.
3. Park J, Minor S, Taylor RA, Vikis E, Poenaru D. Why are women deterred from general surgery training? *Am J Surg.* 2005;190(1):141-146.
4. Troppmann KM, Palis BE, Goodnight JE Jr, Ho HS, Troppmann C. Career and lifestyle satisfaction among surgeons: what really matters? the National Lifestyles in Surgery Today survey. *J Am Coll Surg.* In press.
5. Mayer KL, Ho HS, Goodnight JE Jr. Childbearing and child care in surgery. *Arch Surg.* 2001;136(6):649-655.
6. Carty SE, Colson YL, Garvey LS, et al. Maternity policy and practice during surgery residency: how we do it. *Surgery.* 2002;132(4):682-688.
7. Kao LS, Wilson EB, Anderson KD. Perceptions and predictors of surgeon satisfaction: a survey of spouses of academic surgeons. *J Am Coll Surg.* 2005;200(5):684-690.
8. Colletti LM, Mulholland MW, Sonnad SS. Perceived obstacles to career success for women in academic surgery. *Arch Surg.* 2000;135(8):972-977.
9. Schroen AT, Brownstein MR, Sheldon GF. Comparison of private versus academic practice for general surgeons: a guide for medical students and residents. *J Am Coll Surg.* 2003;197(6):1000-1011.
10. Caniano DA, Sonnino RE, Paolo AM. Keys to career satisfaction: insights from a survey of women pediatric surgeons. *J Pediatr Surg.* 2004;39(6):984-990.
11. Schroen AT, Brownstein MR, Sheldon GF. Women in academic general surgery. *Acad Med.* 2004;79(4):310-318.
12. Stabile BE. The surgeon: a changing profile. *Arch Surg.* 2008;143(9):827-831.
13. Dorsey ER, Jarjoura D, Rutecki GW. Influence of controllable lifestyle on recent trends in specialty choice by US medical students. *JAMA.* 2003;290(9):1173-1178.
14. Buyske J. Women in surgery: the same yet different. *Arch Surg.* 2005;140(3):241-244.
15. Kuerer HM, Eberlein TJ, Pollock RE, et al. Career satisfaction, practice patterns and burnout among surgical oncologists: report on the quality of life of members of the Society of Surgical Oncology. *Ann Surg Oncol.* 2007;14(11):3043-3053.
16. Vanderveen K, Bold RJ. Effect of generational composition on the surgical workforce. *Arch Surg.* 2008;143(3):224-226.
17. Kibbe MR, Troppmann C, Barnett CC Jr, et al; Issues Committee of the Association for Academic Surgery and the Social and Legislative Issues Committee of the Society of University Surgeons. Effect of educational debt on career and quality of life among academic surgeons. *Ann Surg.* 2009;249(2):342-348.
18. Lerner LB, Stolzmann KL, Gulla VD. Birth trends and pregnancy complications among women urologists. *J Am Coll Surg.* 2009;208(2):293-297.
19. Mayo Clinic. Family and child care benefits. <http://www.mayoclinic.org/jobs-sct/family.html>. Accessed September 29, 2008.
20. Asch DA, Jedrzejewski MK, Christakis NA. Response rates to mail surveys published in medical journals. *J Clin Epidemiol.* 1997;50(10):1129-1136.
21. College of Family Physicians of Canada, Canadian Medical Association, Royal College of Physicians and Surgeons of Canada. National Physician Survey: 2007 results for surgical specialists. http://www.nationalphysiciansurvey.ca/nps/2007_Survey/Results/ENG/Specialty/pdf/Surgical/Q13/Q13a_CORE.only.pdf. Accessed February 12, 2009.
22. National Physician Survey. National Physician Survey: 2007 response rates. http://www.nationalphysiciansurvey.ca/nps/2007_Survey/response_rates-2007-e.asp. Accessed February 12, 2009.
23. Mayer KL, Perez RV, Ho HS. Factors affecting choice of surgical residency training program. *J Surg Res.* 2001;98(2):71-75.

DISCUSSION

Karen Borman, MD, Orlando, Florida: At the November 2000 meeting of the Western Surgical Association, the UC Davis group presented results of a survey of their own residency graduates about childbearing and parenting patterns. Discussion of that paper was brisk and included our current president, Dr Bruce Gewertz. It, therefore, seems particularly appropriate that Dr Troppmann and colleagues have brought to the 2008 meeting of this association their national survey of graduate surgeons

about the interrelationships of their professional and personal lives. Their findings about work hours differential, marriage to another professional, number and timing of children, and child care concerns are consistent with earlier studies and suggest concurrent validity for their survey. Your satisfaction factors data are also consistent with the data shown in Dr Gewertz's wonderful presidential address.

You have an enormous amount of interesting data. I have lots of questions but will limit myself to 3.

You chose to perform univariate analyses based upon gender for multiple end points, yet time may also be an important factor in your results. American Board of Surgery data support that the fraction of women surgeons rose continuously from 1993 through 2005, and 21st century AAMC [Association of American Medical Colleges] data show that the shift of male US medical graduates to so-called lifestyle specialties has outpaced that of women over time. I would hypothesize that the answers to many of your questions are converging for the men and women who have graduated most recently. Did you consider stratification by time or some form of multivariate analysis, including time, for your study end points other than number of children?

Lifestyle considerations have been invoked as a motivation for choosing a non-board-certified general surgery subspecialty such as breast or endocrine. Using Table 2, it appears that you had 382 respondents self-categorized as practicing general surgery and 162 focusing on a general surgical subspecialty. These are sizable groups. Did you observe any differences in the pattern of answers for these 2 groups?

Finally, are male surgeons the only important comparison group for the questions that you raise? What about men and

women in other medical specialties and in other fields such as dentistry, law, engineering, and computer science? We are all competing for the same talented students.

Dr C. Troppmann: In response to Dr Borman's first question regarding potential intergenerational differences: we had performed additional analyses that showed relative homogeneity between older and more recent ABS certification vintages. It was very impressive to see that surgeons seem to represent a fairly consistent demographic group despite all of the tremendous societal changes that have occurred over the last 20 to 30 years. Even the most recent graduates who entered our specialty gave responses that were similar to the responses of the surgeons who had graduated 20 years ago.

Regarding the second question about a comparison between general and subspecialty surgeons: for this presentation, we focused on sex differences. However, our other analyses suggest that specialty did not impact our results.

Last, regarding the comment about the surgical profession competing with other professions for applicants: this is a question that I think is often overlooked. How do we measure up against fields such as economics or law when it comes to job attractiveness? This is a very important point and one of the main reasons why we conducted this survey. We think that surgeons themselves, female and male, are very important shapers and multipliers of opinions about their profession. I think there is no bigger deterrent than unhappy surgeons for anybody considering a surgical or, for that matter, medical career.

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