ALLIANCE for ACADEMIC INTERNAL MEDICINE

AAIM Perspectives

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A Qualitative, Cross-Sectional Study of Positive and Negative Comments of Residency Programs Across 9 Medical and Surgical Specialties

Brittany O. Dulmage, MD,[a,b] Lisa Akintilo, MD, MPH,[c] Leah J. Welty, PhD,[d] Matthew M. Davis, MD,[c,e] Maria Colavincenzo, MD,[a] Shuai Xu, MD MSc[a,f]

[a]Department of Dermatology, Northwestern University Feinberg School of Medicine, Chicago, Ill; [b]Medical Education Clinical Scholars Program, Northwestern University Feinberg School of Medicine, Chicago, Ill; [c]Northwestern University Feinberg School of Medicine, Chicago, Ill; [d]Division of Biostatistics, Department of Preventive Medicine, Northwestern University Feinberg School of Medicine, Chicago, Ill; [e]Ann & Robert H. Lurie Children's Hospital of Chicago, Chicago, Ill; [f]Center for Bio-Integrated Electronics, Northwestern University, Evanston, Ill.

ABSTRACT

IMPORTANCE: Residency applicants often use social media to discuss the positive and negative features of prospective training programs. An examination of the content discussed by applicants could provide guidance for how a medical education faculty can better engage with prospective trainees and adapt to meet the educational expectations of a new generation of digital-native physicians.

OBJECTIVE: The objective was to identify unstructured social media data submitted by residency applicants and categorize positive and negative statements to determine key themes.

DESIGN: The study design was qualitative analysis of a retrospective cohort.

SETTING: Publicly available datasets were used.

PARTICIPANTS: The participants were anonymized medical trainees applying to residency training positions in 9 specialties—dermatology, general surgery, internal medicine, obstetrics/gynecology, plastic surgery, otolaryngology, physical medicine and rehabilitation, pediatrics, and radiology—from 2007 to 2017.

MAIN OUTCOMES AND MEASURES: After we developed a standardized coding scheme that broke comments down into major features, themes, and subthemes, all unstructured comments were coded by two independent researchers. Positive and negative comments were coded separately. Frequency counts and percentages were recorded for each identified feature, theme, and subtheme. The percent positive and negative comments by specialty were also calculated.

RESULTS: : Of the 6314 comments identified, 4541 were positive and 1773 were negative. Institution was the most commonly cited major feature in both the positive (n = 767 [17%]) and

Funding: None.

Conflict of Interest: None.

Authorship: All authors had access to the data and a role in writing this manuscript.

Requests for reprints should be addressed to Shuai Xu, MD, 676 N. St. Clair St., Suite 1600, Chicago, IL 60611.

E-mail address: stevexu@northwestern.edu

https://doi.org/10.1016/j.amjmed.2018.05.019

negative (n = 827 [47%]) comments. Geography was the most cited theme, and City, Cost of Living, and Commute were commonly cited subthemes. Training was the next most cited major feature in both positive (n = 1005 [22%]) and negative (n = 291 [16%]) comments, with Clinical Training being more commonly cited compared to Research Opportunities. Overall, 72% of comments from all were positive; however, the percent of comments that were positive comments varied significantly across the 9 specialties. Pediatrics (65%), dermatology (66%), and internal medicine (68%) applicants were more likely to express negative comments compared with the global average, but physical medicine and rehabilitation (85%), radiology (82%), otolaryngology (81%), and plastic surgery (80%) applicants were more likely to express positive comments.

CONCLUSIONS AND RELEVANCE: This qualitative analysis of positive and negative themes as posted by applicants in recent matching years is the first and provides new detailed insights into the motivations and desires of trainees.

 • The American Journal of Medicine (2018) 131:1130–1134

KEYWORDS: Internet; Social media; Medical education; Residency; Resident matching

INTRODUCTION

For digital-native millennial medical students, social media is a natural form of communication.[1,2] The social media environment is expansive and rapidly changing, with weekly social media use among 18- to 24-year-olds increasing from 89% to 98% from 2014 to 2016.[3] The average number of social media sites that a young adult visits weekly is 7.6,[3] and a higher education level is associated with increased social media use.[4] This environment allows information that may have been shared only among a group of friends to instead be publicly posted and shared broadly.[5] To this end, medical students and residents are using social media to study, network, discuss patient encounters, job hunt, share research, and more. However, research surrounding medical trainees and social media has largely been limited to professionalism.[6,7] Listening to the voice of patients on platforms such as Yelp has been suggested as a way to understand their needs and improve the experience of health care.[5] Similarly, listening to the digital voice of students and residents may allow for improvement in the delivery of medical education.

For most medical students, the transition from medical student to resident is formative, and the selection of a residency program represents a critical decision, but there is a limited understanding of how modern medical school seniors use social media to assess residency programs. We hypothesized that unstructured social media data created by medical students regarding residency selection will provide new, valuable, and renewable insights on their expectations and preferences for residency training. The National Resident Match Program (NRMP) Applicant Survey provides some insights into candidate preferences, but it is only periodically published and has limited breadth, given its structured design and limited dissemination.[8] A better understanding of the contemporary expectations of medical students would allow residency programs to better recruit and engage prospective learners while adapting to meet the educational expectations of a new generation of physicians.

PERSPECTIVES VIEWPOINTS

- Residency applicants use social media to discuss positive and negative features of residency programs.
- Commonly cited themes and subthemes include geography, clinical education, and fellowship opportunities.
- Social media can be a useful unstructured data source regarding the motivations and desires of residency applicants.

METHODS

We performed an Internet search of key social media sources: Twitter, Reddit, Facebook, Student Doctor Network (SDN), Aunt Minnie, and Otomatch. We selected postings using the following terms: "residency match list," "interview experiences," and "residency rank list." We identified postings related to 9 specialties: dermatology, general surgery, internal medicine, obstetrics/gynecology, plastic surgery, otolaryngology, physical medicine and rehabilitation, pediatrics, and radiology. All searches were conducted within 1 week of the rank list deadline for the 2017 NRMP match (February 22, 2017). This study is exempt from Northwestern Institutional Review Board approval, because it used only publicly available datasets.

A standardized coding scheme was developed (see Supplement 1, available online). The scheme included 3 nested levels: major features, themes, and subthemes. Comments were coded to the highest level of specificity possible; for example, "The city is expensive" is coded as Institution (major feature) > Geography (theme) > Cost of Living (subtheme). Two authors (LA, BD) coded all unstructured comments using NVIVO v11 (QSR International, Burlington, Mass).

Discrepancies were discussed (SX, LA, BD) until a consensus was reached. We determined the proportion of positive comments by specialty using Stata v14 (StataCorp, College Station, Texas) with a logit transform to calculate 95% confidence intervals. We used a logistic regression model to compare the proportion of comments that were positive within each specialty. Specialties were identified as having a greater proportion of positive comments than overall (odds ratio [OR] > 1.0, $P < .05$), a lower proportion of positive comments than overall (OR < 1.0, $P < 0.05$), or not significantly different than average.

RESULTS

Three online resources—SDN, Aunt Minnie, and Otomatch—yielded results that met our search criteria. The most recent relevant posting groups were identified, and up to 3 per specialty were mined for comments. Focusing on the 3 most recent forums and threads by year allowed for a more contemporary analysis. For dermatology, plastic surgery, otolaryngology, internal medicine, and radiology, the forums used corresponded with the 2014−2015, 2015−2016, or 2016−2017 NRMP match cycles. For the remaining specialties, earlier groups were used representing match cycles 2007−2008 (obstetrics/gynecology), 2011−2012 (physical medicine and rehabilitation), and 2012−2013 (general surgery and pediatrics). These postings yielded 6314 total comments (4541 positive and 1773 negative entries) specifically related to individual residency programs. On SDN alone, these comments accounted for more than 1.2 million aggregate views.

Of the positive comments (Figure 1A), Institution was the most commonly cited major feature (n = 1323 [29%]), and Geography was the most cited theme (n = 767 [17%]). City (n = 312 [7%]), Cost of Living (n = 121 [3%]), and Cultural and Leisure Activities (n = 104 [2%]) were the most commonly cited subthemes. Training was the next most cited major feature (n = 1005 [22%]), and Clinical Training (n = 655 [14%]) was more commonly cited than Research Opportunities (n = 238 [5%]). Resident Experience was another commonly cited feature with important themes and subthemes, including Likeable Residents (n = 248 [5%]), Successful Fellowship Placements (n = 197 [4%]), and Perceived Resident Happiness (n = 188 [4%]). Table 1 highlights representative comments from each of these themes and subthemes. Institution was also the most commonly cited negative feature (n = 827 [47%]; see Figure 1B), with Geography being the most cited theme (n = 637 [36%]), and City (n = 191 [11%]), Commute (n = 112 [6%]), and Cost of Living (n = 88 [5%]) being the most cited subthemes (Figure 1B). Training was the next most cited major feature (n = 291 [16%]); again, Clinical Training (n = 226 [13%]) was cited much more commonly than Research (n = 49 [3%]). A summary of major features by specialty is included in the supplementary materials available online.

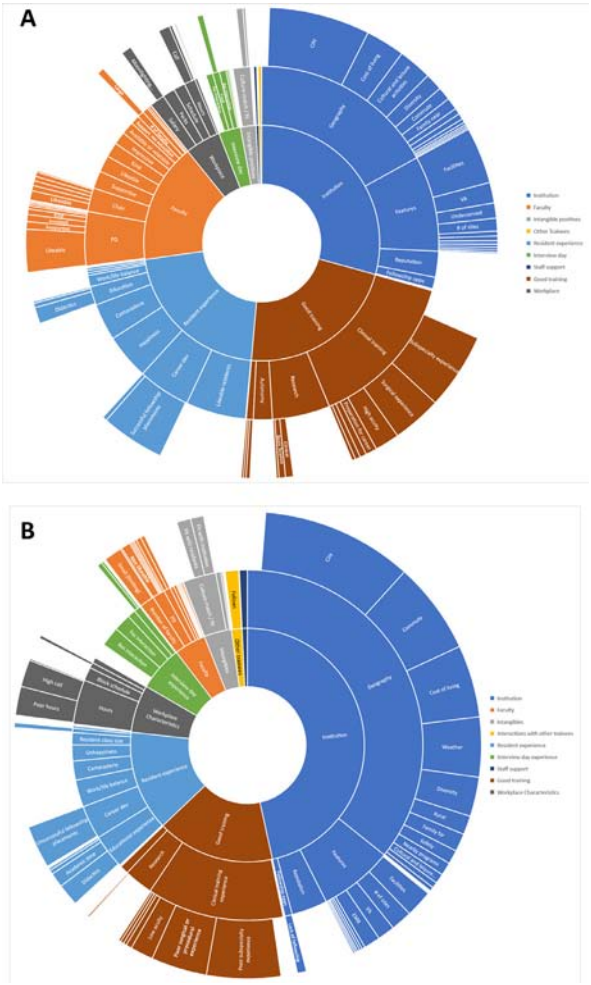

Figure 1 Positive (**A**) and negative (**B**) factors considered across all specialties shown in sunburst hierarchical plots. The inner rings represent broader themes, and the outer rings represent subthemes. Of the 6314 comments coded, 4541 were positive and 1773 were negative as specifically related to applicant descriptions of individual residency programs. These comments accounted for more than 1.2 million aggregate views.

Figure 2 shows the percent of positive comments across the 9 specialties. Overall, 72% of comments were positive; however, there were significant differences across specialties. Pediatrics (65%), dermatology (66%), and internal medicine (68%) applicants were more likely to express negative comments compared to the global average, whereas physical medicine and rehabilitation (85%), radiology (82%), otolaryngology (81%), and plastic surgery (80%) applicants were more likely to express positive comments.

Table 1 Most Commonly Mentioned Positive and Negative Major Features, Themes, and Subthemes and Representative Comments

Major Feature	Theme	Subtheme	Sample Positive Comment	Sample Negative Comment
Institution	Geography	City	"Arguably one of the best places for young people to live"	"Not a great city"
		Cost of living	"Great cost of living"	"Expensive area to live"
		Cultural and leisure activities	"Lots of things to do"	"Really bland small city with not much to do"
		Commute	"Great public transportation options"	"Lots of driving to clinical sites"
Training	Clinical training	Subspecialty training	"Great pulm/critical care department"	"Weaker in peds derm and allergy"
		Surgical training	"Great operative volume, especially in flaps"	"Seemed to be weaker in hand surgery"
	Research training		"Basic science tinnitus and hearing loss research available"	"No funded clinical research"
Resident experience	Likeable residents		"Residents were warm & cordial during dinner"	"Residents seemed cliquey"
	Career development	Successful fellowship placement	"Excellent fellowship match list to outstanding institutions"	"Most recent fellowship match didn't seem great"
	Perceived happiness of residents		"Residents seem very happy here"	"Residents don't seem very happy"

DISCUSSION

Understanding the preferences of residency candidates can provide guidance to residency programs. Medical students are highly active in social media within the context of rating specific residency programs across numerous specialties, and our results provide a review of positive and negative themes posted by applicants in recent matching cycles. Despite differences in the length of training and nature of training in primary, subspecialty, and surgical specialties, the valued features and themes were largely concordant, including Geography, Clinical Training, and Resident Experience.

Nested within Resident Experience, Likable Residents and Perceived Resident Happiness were repeated

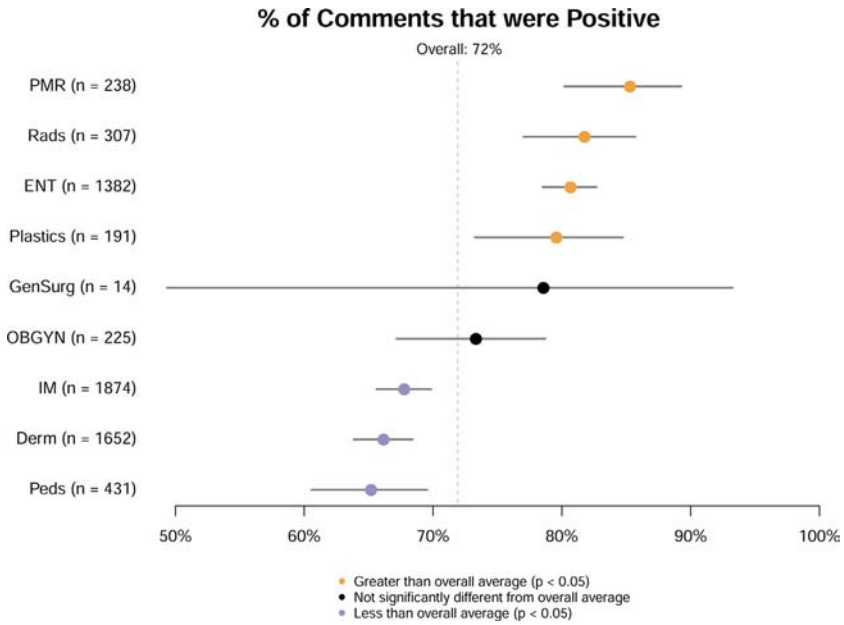

Figure 2 Percentages (and 95% confidence intervals) of positive comments across specialty type out of a total of 6314 comments; numbers in parentheses indicate the comments in that specialty type. The dashed vertical line indicates the overall proportion of positive comments.

themes across several specialties. The Accreditation Council for Graduate Medical Education has made resident wellness initiatives a recent key focus,[9] and our data suggest that improving the well-being of current residents would positively impact resident recruitment. Geography was the most commonly cited positive and negative theme and also the most important factor in prior studies, including the 2017 NRMP Applicant Survey.[8,10] Although location is intrinsic and immutable, subtheme analysis illuminates how a program could best present itself, a nuance lacking in the NRMP dataset. As an example, programs could address the issues of cost of living, commuting, and cultural activities by highlighting reasonable living options, public transportation or ridesharing, concerts, sporting events, and outdoor activities during interviews and on their websites.

The variation in positive comments by specialty has several implications. Programs with more critical applicants could focus on addressing perceived negative features during interviews. Programs with more positive applicants could focus their attention on accentuating their strengths. Ultimately, the skew toward more positive or negative comments may also reflect applicants of a certain specialty being more critical or more willing to share negative opinions.

There are several limitations to this analysis. The majority of comments originated on a single site, SDN, with the notable exceptions of radiology and otolaryngology. Because comments are posted anonymously, we were unable to control for characteristics of the commenter. Although we cannot say how many unique posters contributed to the comments, the total number of views of each page would suggest that the information shared was disseminated widely. Studies of "lurkers" in social media settings have found that many find just reading the content is enough, suggesting that individuals who view without posting may still be influenced by what they read.[11] The significant range in the number of comments among the different specialties reflects specialty-specific variability in the use of social media. Finally, our data cannot provide the relative importance of each theme to respondents. Although NRMP provides a weighted average of the importance of a feature, the majority of items fall within a narrow range.

The use of social media comes naturally to millennial learners, who tend to be collaborative, inclusive, and desiring of feedback.[2] It is not surprising that residency applicants commonly use social media to discuss and obtain peer feedback with regard to potential residency programs. Our results demonstrate that social media can be a useful, unstructured data source that offers some advantages compared to traditional, structured survey approaches. Such data allow for a more stratified understanding of the motivations and desires of current applicants. In medical schools, faculty have already begun to adapt to the needs of millennial learners by soliciting their feedback, leading to the de-emphasizing of traditional lectures in favor of small groups and team-based activities.[12-14] Residency programs might consider the online comments of applicants in order to recruit the strongest applicants and adapt to their changing preferences and expectations for post-graduate training. Medical educators themselves should consider participating directly in social media to, for example, dispel rumors, in addition to establishing a safe, anonymous platform for engaging with prospective residents.

SUPPLEMENTARY DATA

Supplementary material accompanying this article can be found in the online version at doi:10.1016/j.amjmed.2018.05.019

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SUPPLEMENT 1

Positive Coding Schema

1 **Faculty**

a Academic
b Aligned research
c Available or relatable
d Broad range of faculty interests
e Chair

i Aligned research interests
ii Available or relatable
iii Experienced
iv Honest
v Impressive or prestigious
vi Involved

vii Kind

viii Likeable
ix Supportive

f Experienced
g Impressive or prestigious
h Kind
i Likeable
j Number of faculty

i Large (increased opportunities)
ii Small (intimate)

k Program Director

i Aligned research interests
ii Available or relatable
iii Experienced
iv Honest
v Impressive or prestigious
vi Involved

vii Kind

viii Likeable
ix Supportive

l Sufficient supervision of clinical practice
m Support resident career development
n Support resident education
o Support resident research
p Supportive

2 **Good Training**

a Clinical training experience

i Continuity
ii Electives
iii Externships
iv Global health, international opportunities
v Good subspecialty experience
vi Good surgical/procedural experience

vii High acuity/volume

viii Other experience
ix Preparation for future attending job

1 Good academic practice training
2 Good private practice training

b External, outside training opportunities

i Business
ii Education
iii Ethics
iv Global/ public health
v Innovation
vi Law

c Research opportunities, strength of areas of concentration

i Basic science
ii Clinical
iii Health services, health policy
iv Other

d Sufficient autonomy

3 **Institution**

a Features

i Academic or library resources
ii Community program
iii County or underserved population
iv Diversity of institution
v Endowment
vi External certifications (ex. level 1 trauma, stroke)
vii Facilities
viii Health information technology (EHR)
ix Pharmaceutical company interactions
x Private
xi Public
xii Size (number of sites)
xiii VA

b Fellowship opportunities

i Number of fellowship spots
ii Presence of intended fellowship

c Geography

i City
ii Coastal
iii Commute
iv Cost of living
v Cultural and leisure activities
vi Diversity

vii Mix of rural and city
viii Near family connections
ix Near friend connections
x Opportunities for significant other
xi Relationship to nearby program
xii Rural
xiii Safety
xiv Weather

d Reputation

i NIH ranking
ii Other rankings
iii US News ranking

e Visa sponsorships

i H-1B
ii J1

4 **Intangible Positive Features**

a Clinically oriented program
b Culture match/fit

i Fit with faculty culture
ii Fit with institutional culture
iii Fit with resident culture
iv Supportive

c Research-oriented program
d Service-oriented program

5 **Interactions with Other Trainees**

a Fellows
b Nurse practitioners
c Physician assistants

6 **Interview Day Experience**

a Experience with co-applicants
b Faculty interaction during visit
c Food

i Breakfast
ii Lunch
iii Pre-interview dinner

d Gifts
e Overall organization and logistics
f Program offered financial assistance
g Resident interaction during visit
h Staff interaction during visit
i Travel cost

7 **Resident Experience**

a Camaraderie amongst residents
b Career development

i Successful fellowship placements

1 External fellowship placement
2 Internal fellowship placement

ii Successful job placement

c Educational experience

i Academic time
ii Didactics
iii Emphasis on boards preparation
iv High board passage rates

d Impressive track record/background of residents

i Academic performance of residents
ii Prestige of medical schools
iii Research output of current residents

e Likeable residents
f Perceived resident happiness
g Positive work-life balance
h Resident class size
i Resident feedback is taken seriously

8 **Staff Support**

a Administrative support
b Ancillary clinical staff
c GME support
d Research staff support

9 **Workplace Characteristics**

a Benefits

i Disability insurance
ii Health insurance
iii Life insurance
iv Paternal/maternal leave

b Block schedule
c Hours

i Call
ii Good hours
iii Meets duty hours

d Perks
e Salary

i Moonlighting opportunities

Negative Coding Schema

1 **Faculty**

a Chair

i Inexperienced
ii Not academic
iii Not available or relatable
iv Not honest

v Not impressive or prestigious
vi Not involved
vii Not kind
viii Not likeable
ix Not supportive
x Research interests not aligned

b Inexperienced
c Lack of faculty support for resident research
d Lack of sufficient supervision of clinical practice
e Lack of support for resident career development
f Lack of support of residency education
g Limited range of faculty interests
h Not academic
i Not available or relatable
j Not impressive or prestigious
k Not kind
l Not likeable
m Not supportive
n Number of faculty

i Large (overwhelming, decreased intimacy)
ii Small (limiting)

o Program Director

i Inexperienced
ii Not academic
iii Not available or relatable
iv Not honest
v Not impressive or prestigious
vi Not involved
vii Not kind
viii Not likeable
ix Not supportive
x Research interests not aligned

2 **Poor Training**

a Clinical training experience

i Continuity
ii Electives
iii Externships
iv Global health, international opportunities
v Low acuity or volume
vi Other experience

vii Poor subspecialty experience

viii Poor surgical/procedural experience
ix Preparation for future attending job

1 Poor academic practice training
2 Poor private practice training

b External, outside training opportunities

i Business
ii Education
iii Ethics
iv Global / public health
v Innovation
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c Insufficient autonomy
d Research opportunities, strength of areas of concentration

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xi Public
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b Fellowship opportunities

i Number of fellowship spots
ii Lack of intended fellowship

c Geography

i City
ii Coastal
iii Commute
iv Cost of living
v Cultural and leisure activities
vi Diversity
vii Mix of rural and city
viii Near family connections
ix Near friend connections
x Opportunities for significant other
xi Relationship to nearby program
xii Rural
xiii Safety
xiv Weather

d Reputation

i NIH ranking
ii Other rankings

iii US News ranking

e Visa sponsorships

i H-1B
ii J1

4 **Intangible Negative Features**

a Clinically oriented program
b Culture match/fit

i Fit with faculty culture
ii Fit with institutional culture
iii Fit with resident culture
iv Not supportive

c Research-oriented program
d Service-oriented program

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c Physician assistants

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f Program did not offer financial assistance
g Resident interaction during visit
h Staff interaction during visit
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1 External fellowship placement
2 Internal fellowship placement

ii Unsuccessful job placement

c Educational experience

i Academic time
ii Didactics
iii Emphasis on boards preparation
iv Low board passage rates

d Negative work-life balance
e Not likeable residents
f Perceived resident unhappiness
g Resident class size
h Resident feedback is not taken seriously
i Track record/background of residents

i Academic performance of residents
ii Prestige of medical schools
iii Research output of current residents

8 **Staff Support**

a Administrative support
b Ancillary clinical staff
c GME support
d Research staff support

9 **Workplace Characteristics**

a Benefits

i Disability insurance
ii Health insurance
iii Life insurance
iv Paternal/maternal leave

b Block schedule
c Hours

i Exceeds duty hours
ii High call
iii Poor hours

d Perks
e Salary

i Moonlighting opportunities

Positive Themes			Negative Themes		
Specialty	**Major Feature**	**Count (%)**	**Specialty**	**Major Feature**	**Count (%)**
PMR		**203 (5)**	**PMR**		**35 (2)**
	Institution	53 (26)		**Institution**	21 (60)
	Training Experience	47 (23)		**Training Experience**	3 (9)
	Resident Experience	32 (16)		**Resident Experience**	4 (11)
	Faculty	43 (21)		**Workplace Characteristics**	3 (9)
	Workplace Characteristics	12 (6)		**interview Day Experience**	2 6)
	Interview Day Experience	12 (6)		**Faculty**	1 (3)
Radiology		**251 (6)**	**Radiology**		**56 (3)**
	Institution	70 (28)		**Institution**	35 (63)
	Training Experience	26 (10)		**Training Experience**	2 (4)
	Resident Experience	86 (34)		**Resident Experience**	8 (14)
	Faculty	31 (12)		**Workplace Characteristics**	4 (7)
	Workplace Characteristics	29 (12)		**interview Day Experience**	5 (9)
	Interview Day Experience	6 (2)		**Faculty**	0
ENT		**1115 (25)**	**ENT**		**267 (15)**
	Institution	332 (30)		**Institution**	116 (43)
	Training Experience	249 (22)		**Training Experience**	56 (21)
	Resident Experience	208 (19)		**Resident Experience**	21 (8)
	Faculty	217 (19)		**Workplace Characteristics**	22 (8)
	Workplace Characteristics	43 (4)		**interview Day Experience**	22 (8)
	Interview Day Experience	50 (4)		**Faculty**	14 (5)
Plastics		**152 (3)**	**Plastics**		39 (2)
	Institution	24 (16)		**Institution**	14 (36)
	Training Experience	38 (25)		**Training Experience**	13 (33)
	Resident Experience	55 (36)		**Resident Experience**	1 (3)
	Faculty	26 (17)		**Workplace Characteristics**	10 (26)
	Workplace Characteristics	6 (4)		**interview Day Experience**	0
	Interview Day Experience	2 (1)		**Faculty**	1 (3)
General Surgery		**11 (1)**	**General Surgery**		**3 (1)**
	Institution	6 (55)		**Institution**	0
	Training Experience	4 (36)		**Training Experience**	1 (33)
	Resident Experience	1 (9)		**Resident Experience**	2 (67)
	Faculty	0		**Workplace Characteristics**	0
	Workplace Characteristics	0		**interview Day Experience**	0
	Interview Day Experience	0		**Faculty**	0
OBGYN		**165 (4)**	**OBGYN**		**60 (3)**
	Institution	46 (28)		**Institution**	20 (33)
	Training Experience	40 (24)		**Training Experience**	10 (17)
	Resident Experience	34 (21)		**Resident Experience**	14 (23)
	Faculty	11 (7)		**Workplace Characteristics**	4 (7)
	Workplace Characteristics	10 (6)		**interview Day Experience**	8 (13)
	Interview Day Experience	20 (12)		**Faculty**	0
Internal Medicine		**1270 (28)**	**Internal Medicine**		**604 (34)**
	Institution	409 (32)		**Institution**	309 (51)
	Training Experience	247 (19)		**Training Experience**	52 (9)
	Resident Experience	289 (23)		**Resident Experience**	109 (18)
	Faculty	183 (14)		**Workplace Characteristics**	36 (6)
	Workplace Characteristics	52 (4)		**interview Day Experience**	32 (5)
	Interview Day Experience	14 (1)		**Faculty**	12 (2)
Dermatology		**1093 (24)**	**Dermatology**		**559 (32)**
	Institution	285 (26)		**Institution**	235 (42)
	Training Experience	303 (27)		**Training Experience**	137 (25)
	Resident Experience	210 (19)		**Resident Experience**	71 (12)

(*Continued*)

Positive Themes			Negative Themes		
Specialty	**Major Feature**	**Count (%)**	**Specialty**	**Major Feature**	**Count (%)**
	Faculty	216 (20)		**Workplace Characteristics**	23 (4)
	Workplace Characteristics	41 (4)		**interview Day Experience**	35 (6)
	Interview Day Experience	27 (2)		**Faculty**	46 (8)
Pediatrics		**281 (6)**	**Pediatrics**		**150 (8)**
	Institution	98 (35)		**Institution**	77 (51)
	Training Experience	51 (18)		**Training Experience**	17 (11)
	Resident Experience	53 (19)		**Resident Experience**	15 (10)
	Faculty	0		**Workplace Characteristics**	14 (9)
	Workplace Characteristics	27 (10)		**interview Day Experience**	7 (5)
	Interview Day Experience	6 (2)		**Faculty**	3 (2)