



Faculty and Peer Support During Pediatric Residency: Association With Performance Outcomes, Race, and Gender

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ABSTRACT

PURPOSE: To examine the association of resident perception of colleague and faculty support with performance, as measured by milestones-based competency scores, exploring associations between race and gender and perception of support and milestone scoring.

METHODS: Resident satisfaction was measured using an annual survey of residents at 49 pediatric residency programs in 2016, 2017, and 2018. Satisfaction with colleague and faculty support was measured using Likert scale survey questions. Pediatric Milestone Competency scores were obtained from the Association of Pediatric Program Directors' Longitudinal Educational Assessment Research Network. Analysis included linear fixed-effects models to examine the relationship between support satisfaction, race, gender, and spring milestone scores.

RESULTS: Over 60% of eligible residents responded to the survey. The majority of residents were satisfied with colleague and faculty support, with those identifying as Asian or underrepresented in medicine (URM) reporting lower rates of

satisfaction than White peers. Residents satisfied with colleague support had higher milestone scores compared to those with a neutral degree of satisfaction. Residents reporting dissatisfaction with colleague and faculty support had lower milestone scores in most competency domains. Residents identifying as URM had lower milestone scores than White residents, which was partially mediated by lower rates of support satisfaction.

CONCLUSIONS: Resident satisfaction with colleague and faculty support correlates with milestone performance. In particular, dissatisfied residents have lower scores than those who are neutral or satisfied. Racial inequities in resident milestone scores may be partially driven by lower rates of support satisfaction among underrepresented residents.

KEYWORDS: clinical learning environment; graduate medical education; health equity; resident well-being

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WHAT'S NEW

Residents who report dissatisfaction with program support have lower milestones-based competency scores compared to colleagues. Residents identifying as Asian, African American, Hispanic, Native American, or Pacific Islander are less likely to be satisfied, and are scored lower than White colleagues.

THE IMPORTANCE OF the clinical learning environment (CLE) is reflected in the Accreditation Council for Graduate Medication Education (ACGME) Clinical Learning Environment Review program, which guides organizational policies and practices to prioritize supportive learning environments, resident well-being, and patient safety.

Though definitions of the CLE are evolving, experts suggest it encompasses psychological, interpersonal, physical, curricular, structural, cultural, and contextual domains.^{1,2} Optimizing CLEs may support resident and patient outcomes as research suggests organizational and system factors are integral to physician well-being and provision of high-quality patient care.^{3–5}

Although educators agree that the CLE influences resident education, evidence linking aspects of the CLE to outcomes is still emerging. While some studies have failed to demonstrate a relationship between the CLE and performance,⁶ others have found associations between positive perceptions of the CLE, work engagement, and job satisfaction.^{7,8} Social connection and a sense of belonging are core human needs,⁹ and studies suggest that

social interactions and support may impact job-related outcomes. Feeling supported has been correlated with better job performance and satisfaction,^{10,11} subjective well-being,¹² more positive experience of work stress,¹³ higher academic performance in medical school and residency,¹⁴ and a decreased risk of burnout.¹⁵ Alternatively, feelings of exclusion, lack of support, racism, discrimination, harassment, and bias can foster a toxic CLE that threatens trainee well-being and educational success.^{16–18} This is particularly true for residents who identify as women and/or Black, Indigenous, or People of Color, given growing evidence of gender and racial discrimination and inequities among such trainees and faculty.^{19,20} Though such experiences may influence perceptions of the learning environment, educational outcomes, and measures of performance,²¹ more data are needed to better understand potential inequities in the experiences of the CLE.

With this in mind, we designed a secondary analysis of a prospective cohort study of a national sample of pediatric residents, aiming to examine the relationship between residents' satisfaction with program support and resident performance as defined by milestones-based competency assessments. We hypothesized that degree of satisfaction with support would be associated with performance scores and that there would be differences in support satisfaction and performance by resident race and/or gender.

METHODS

DESIGN, CONTEXT, AND SETTING

We designed a secondary analysis of 2016, 2017, and 2018 data from the Pediatric Residency Burnout—Resilience Study Consortium (PRB-RSC) to examine the relationship between residents' satisfaction with support, performance, race, and gender. The PRB-RSC and its relationship to the Association of Pediatric Program Directors' Longitudinal Educational Assessment Research Network (APPD LEARN) have been described previously.²² Each residency program participating in the PRB-RSC obtained local institutional review board approval.

PARTICIPANTS

Participants included residents from pediatric or medicine-pediatrics combined programs in the PRB-RSC. Resident recruitment has been described in detail previously.^{22,23} Briefly, we conducted an online survey of pediatric residents in Spring of 2016, 2017, and 2018 using the APPD LEARN online survey tool. There were no additional inclusion or exclusion criteria for this study. Each program participating in the PRB-RSC sent the survey to their residents via e-mail, with reminders to nonresponders. During the study period, 34, 43, and 49 residency programs participated in 2016, 2017, and 2018, respectively.

SURVEY INSTRUMENT

The survey instrument has been described previously.¹⁵ Briefly, it included basic demographic information, validated well-being measurements, and Likert-scale survey

questions developed by the PRB-RSC Steering Committee to measure resident satisfaction with support from faculty and colleagues. Questions to measure satisfaction read, "Please rate your satisfaction with the level of support provided to you over the last year by," followed by separate 5-point Likert-scale choices for both faculty support and colleague support, ranging from 5 = very satisfied to 1 = very dissatisfied.

MILESTONE COMPETENCY MEASUREMENTS

To measure resident performance, Pediatric Milestone Competency scores were obtained from the APPD LEARN database that houses unique identifiers for each resident, allowing performance to be tracked over time and linked to PRB-RSC survey responses. Pediatric Milestone Competency scores summarize resident performance during the prior 6 months as reported to the ACGME by programs, based on entry by program leadership after counsel from Clinical Competency Committees (CCC).²⁴ Scores in each of the 6 ACGME competency domains were reported by residency programs for each resident to APPD LEARN in Spring of each year. Milestone competency domains for pediatric residents include: Patient care (PC), Medical Knowledge (MK), Systems-based practice (SBP), Practice-based learning and improvement (PBLI), Professionalism (PROF), and Interpersonal Communication Skills (ICS). A variable number of subcompetencies exist within each core domain, assessing specific elements of the core competency; descriptions can be found in the appendix. Milestone scores range from 1 to 4 or 1 to 5 with scores of 4 and 5 representing highest success in those areas and half-points possible.

DATA

PRB-RSC survey responses related to satisfaction with faculty and colleague support were grouped into 3 categories for analysis: satisfied (very satisfied or satisfied), neutral, or dissatisfied (dissatisfied or very dissatisfied). Resident milestone scores were treated as continuous variables. Resident programs were grouped into 3 size categories: small (<30 residents), medium (30–59 residents), and large (>60 residents). The size categories represent approximate terciles in the distribution of resident program sizes.

STATISTICAL ANALYSIS

We examined predictors of residents' satisfaction (vs neutral or dissatisfied) with faculty and colleague support by program size using a logistic mixed-effects regression model with fixed effects of program size category (small, medium, large), resident year and a random effect of program to adjust for clustering of responses in programs. We then fitted a similar model to examine race and gender differences in satisfaction. Because of the small number of residents self-identifying as African American, Hispanic, Native American, Pacific Islander, and Other, we compared perceptions of support across 3 groups, 1) White (n = 4170, 71.7%), 2) Asian (n = 889, 15.2%), and 3) underrepresented in medicine (URM)²⁵: African American, Hispanic, Native American, Pacific Islander, and Other (n = 781, 13%). The model

included fixed effects of race (White, Asian, or URM), gender (male or female), year of data collection, and a random effect of learner within program.

Next, we explored the association of satisfaction (satisfied, neutral, or dissatisfied) with performance in competency and subcompetency scores. For each competency domain (or selected subcompetency), we fitted a linear mixed-effects model that included fixed effects of race (White, Asian, URM), resident year, faculty and colleague support (as main effects and in interaction with resident year), type of residency program (categorical, med/peds, or combined, as a main effect an interaction with resident year), random intercepts for learner and program, and a random slope for resident year within program. We did not include gender, because there we found no gender differences in milestone scores in the logistic mixed-effects regression model. To assess association between support and performance gains over time, we fitted a mixed-effects linear growth model to each domain score over post-graduate year (PGY), conditional on faculty and colleague support, program size and type of residency program, and adjusting for learner race, clustering in program, and program size. We tested the simple slopes associated with faculty or colleague support (satisfied or dissatisfied vs neutral) in these models. For the subcompetency analysis, we selected those subcompetencies from the multivariate analysis with the largest competency domain score effect in either faculty or colleague support ($\Delta > 0.2$). We conducted a causal mediation analysis to distinguish the average causal mediation effect from average direct effect of URM status on performance with support as a mediator, and controlling for clustering in program, program size, and type of program. Analyses were conducted using R3.6 (R Core Team, Vienna, Austria) and the lme4 package.²⁶

RESULTS

Over the 3-year study, 4079 unique residents completed surveys, with a total of 5835 survey responses (response rate of 61% in 2016, 66% in 2017, and 61% in 2018). Demographics are listed in Table 1. The majority of residents in the study identified as White (70.1%), female (72.1%), and without children (86%). Residents represented 52 programs from all geographic regions of the United States.

RESIDENT SATISFACTION WITH SUPPORT

The majority of residents reported that they were satisfied or very satisfied with faculty and colleague support, though rates of satisfaction were higher for colleague support (Table 2). Residents from large programs were more likely to report satisfaction with colleague support than those in medium-sized, 87% compared to 84%, adjusted for learner PGY and clustering in programs (adjusted odds ratio [AOR] = 1.26, 95% confidence interval [CI] 1.03–1.54, $P = .026$). There was trend toward lower satisfaction with colleagues' support for residents in small (79% satisfied), compared to those in medium-sized programs, but this did not reach significance ($P = .057$). There was no difference in satisfaction with faculty support by program size.

Table 1. Demographics for All Unique Residents

Participants	N = 4079 n (%)
Gender	
Female (%)	2942 (72.1)
Male (%)	1179 (29)
Not reported (%)	48 (2.3)
Race	
African-American (%)	148 (3.6)
Asian (%)	642 (15.8)
Hispanic (%)	191 (4.7)
Native American (%)	19 (0.5)
Other (%)	170 (4.2)
Pacific Islander (%)	9 (0.2)
White (%)	2881 (70.1)
Personal characteristics	
Married (%)	2320 (57.1)
Have Children (%)	571 (14.1)
Pregnant (%)	131 (4.5)
Living situation	
Alone (%)	1347 (33.1)
With family (%)	1694 (41.6%)
Non-related housemates (%)	794 (19.5)
Other (%)	236 (5.8)
Program region	
Mid-America (%)	1007 (24.7)
Mid-Atlantic (%)	584 (13.4)
Midwest (%)	714 (17.5)
New England (%)	332 (8.1)
New York (%)	93 (2.3)
Southeast (%)	496 (12.2)
Southwest (%)	148 (3.6)
Western (%)	740 (18.1)
Program size (number of residents)	
<30 (%)	208 (5.1)
30-59 (%)	1147 (28.1)
>60 (%)	2723 (66.8)

RELATIONSHIP BETWEEN RESIDENT SATISFACTION WITH SUPPORT AND PERFORMANCE

In the first linear mixed-effects model, we compared dissatisfied or satisfied residents to neutral responders. In the cross-sectional analysis of PGY1 residents, faculty support was not correlated with resident performance in any of the core milestone competencies. However, satisfaction with colleague support was associated with significantly higher competency scores in 5 domains: PC ($\Delta = 0.08$, $P = .03$), SPB ($\Delta = 0.08$, $P = .04$), Practice-based learning and improvement (PBLI) ($\Delta = 0.09$, $P = .02$), Professionalism ($\Delta = 0.08$, $P = .03$), and ICS ($\Delta = 0.1$, $P = .012$). In the longitudinal analysis, differences between satisfied and neutral residents remained, and the difference in scores between those groups did not change from PGY1 to 2 or 3.

In the second model, comparing PGY1 residents who were dissatisfied with support to others (those responding neutral, satisfied, or very satisfied), dissatisfaction with faculty and colleague support was associated with significantly lower milestone scores in all core competencies except 2: PBLI for colleague support and SBP for faculty support ($P < .05$, Table 4), and with significantly lower scores in 10 and 9 selected subcompetencies, respectively ($P < .05$, Table 4). The Figure demonstrates an expected

Table 2. Resident Satisfaction With Support by PGY (Raw Responses)

			Dissatisfied (%)	Neutral (%)	Satisfied (%)	
Colleague support	All n = 5810	n	237 (4.1)	584 (10.1)	4989 (85.9)	
		PGY1	80 (3.8)	184 (8.8)	1821 (87.3)	
		PGY2	78 (4.0)	208 (10.6)	1674 (85.4)	
	White n = 4170	PGY3	79 (4.5)	192 (10.9)	1494 (84.6)	
		n	142 (3.4)	396 (9.5)	3632 (87.1)	
		PGY1	53 (3.6)	121 (8.1)	1313 (88.3)	
	PGY2	46 (3.3)	149 (10.6)	1217 (86.2)		
		PGY3	43 (3.4)	126 (9.9)	1102 (86.7)	
		Asian n = 889	n	45 (5.1)	96 (10.8)	748 (84.1)
	PGY1	11 (3.5)	30 (9.5)	275 (87.0)		
		PGY2	17 (5.6)	27 (8.9)	260 (85.5)	
		PGY3	17 (6.3)	39 (14.5)	213 (79.2)	
	URM n = 727	n	49 (6.7)	90 (12.4)	588 (80.9)	
		PGY1	15 (5.5)	33 (12.0)	226 (82.5)	
		PGY2	15 (6.5)	31 (13.4)	186 (80.2)	
	PGY3	19 (8.1)	26 (11.8)	176 (79.6)		
		Women n = 4222	n	168 (4.0)	393 (9.3)	3661 (86.7)
		PGY1	50 (3.3)	129 (8.5)	1338 (88.2)	
	PGY2	55 (3.9)	136 (9.6)	1229 (86.5)		
		PGY3	63 (4.9)	131 (10.2)	1094 (84.9)	
		Men n = 1563	n	69 (4.4)	185 (11.8)	1309 (83.7)
PGY1	30 (5.3)	54 (9.6)	478 (85.1)			
	PGY2	23 (4.3)	70 (13.2)	438 (82.5)		
	PGY3	16 (3.4)	61 (13.0)	393 (83.6)		
Faculty support	All n = 5809	n	717 (12)	1263 (22)	3829 (66)	
		PGY1	220 (10.6)	414 (19.9)	1450 (69.6)	
		PGY2	270 (13.8)	469 (23.9)	1220 (62.3)	
	White n = 4168	PGY3	227 (12.9)	380 (21.5)	1159 (65.6)	
		n	486 (12)	875 (21)	2810 (67)	
		PGY1	150 (10.1)	283 (19.0)	1053 (70.9)	
	PGY2	190 (13.5)	332 (23.5)	890 (63.0)		
		PGY3	146 (11.5)	260 (20.4)	867 (68.1)	
		Asian n = 889	n	114 (13)	224 (25)	551 (62)
	PGY1	34 (10.8)	75 (23.7)	207 (65.5)		
		PGY2	41 (13.5)	80 (26.4)	182 (60.1)	
		PGY3	39 (14.4)	69 (25.6)	162 (60.0)	
	URM n = 725	n	115 (16)	159 (22)	451 (62)	
		PGY1	35 (12.8)	54 (19.7)	185 (67.5)	
		PGY2	38 (16.4)	55 (23.7)	139 (59.9)	
	PGY3	42 (19.2)	50 (22.8)	127 (58.0)		
		Women n = 4226	n	519 (12)	910 (22)	2797 (66)
		PGY1	159 (10.5)	306 (20.2)	1052 (69.3)	
	PGY2	193 (13.6)	335 (23.6)	892 (62.8)		
		PGY3	167 (13.0)	269 (20.9)	853 (66.2)	
		Men n = 1561	n	195 (12)	349 (22)	1017 (65)
PGY1	60 (10.7)	107 (19.1)	394 (70.2)			
	PGY2	75 (14.2)	132 (24.9)	323 (60.9)		
	PGY3	60 (12.8)	110 (23.4)	300 (63.8)		

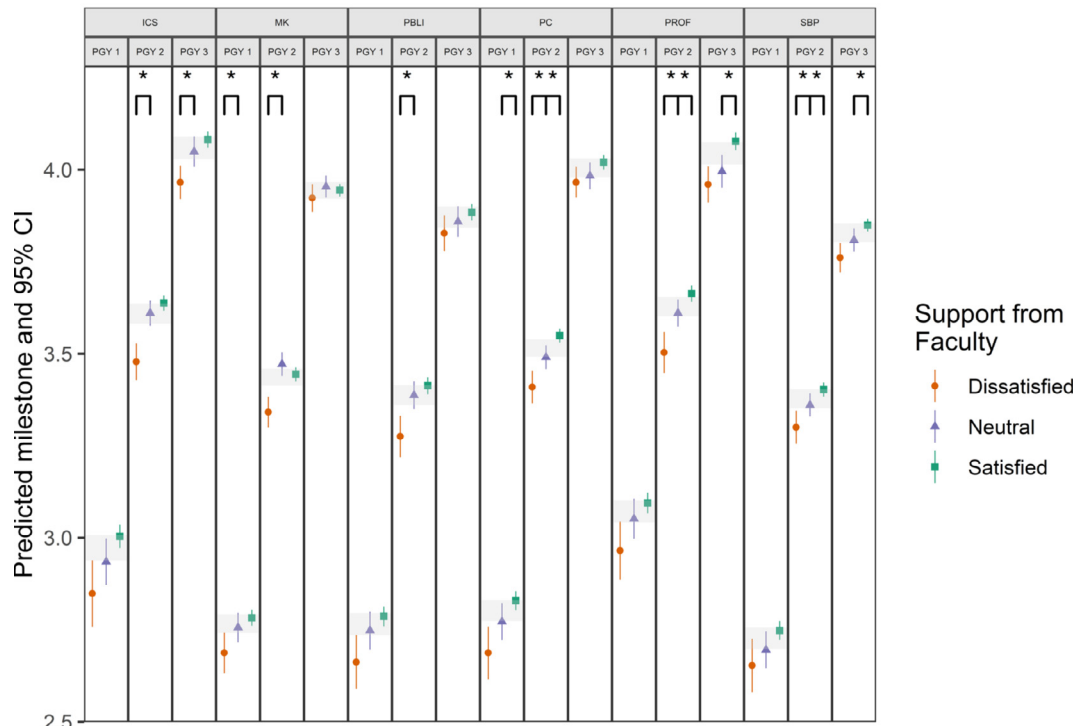
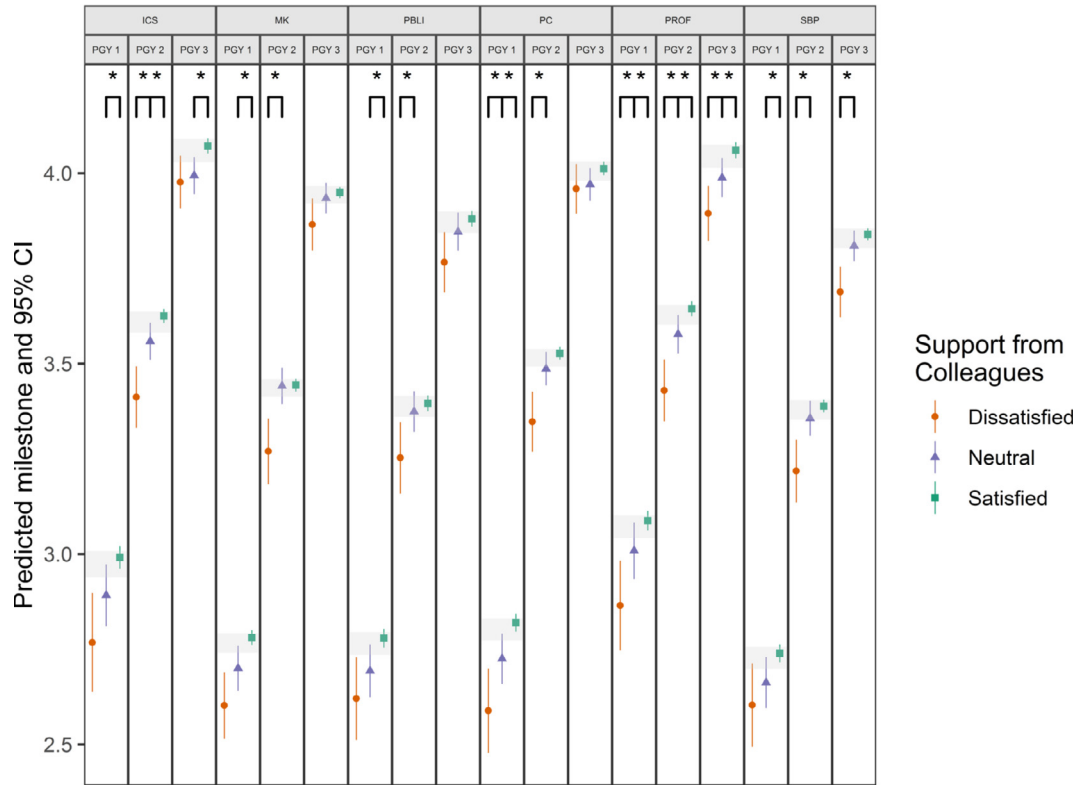
URM indicates underrepresented in medicine; PGY, post-graduate year.

upward progression of milestone competency scores from PGY 1, 2, and 3. In addition to the relationship between dissatisfaction and scores for PGY1 residents, the [Figure](#) illustrates a persistent relationship between resident dissatisfaction and milestone scores in several core competency domains for PGY 2 and 3 residents. Satisfaction with colleague or faculty support was not correlated with the rate of resident milestone score increase over time.

EFFECT OF RACE AND GENDER ON SATISFACTION

[Table 2](#) provides the raw resident satisfaction responses by race and gender. To identify differences in

satisfaction by race or gender, responses were analyzed adjusting for clustering in programs, data collection cycle, and PGY. After these adjustments, URM residents reported slightly (87% vs 88%, $P = .03$), but significantly lower rates of colleague support than White residents (AOR = 0.46, 95% CI 0.22–0.94, $P = .03$). Asian and URM residents were substantially (36% and 37% vs 46%) and significantly less likely to report satisfaction with faculty support than White residents (AOR = 0.74, 95% CI 0.60–0.90, $P = .003$ and AOR = 0.75, 95% CI 0.61–0.94, $P = .01$). There were no differences in satisfaction with faculty or colleague support by gender.



*P < 0.05

Grey bars are centered on the mean milestone score for each competency for all year 1, 2 and 3 residents in the study, respectively.

Figure. Core competency scores and satisfaction with colleague support by post-graduate year (PGY). PC indicates Patient care; MK, Medical knowledge; SBP, System-based practice; PBLI, Practice-based learning and improvement; PROF, Professionalism; and ICS, Interpersonal Communication Skills.

RELATIONSHIP BETWEEN PERFORMANCE, SUPPORT SATISFACTION, RACE, AND GENDER

Given the significant difference in support by racial identity, we looked for differences in resident performance scores by self-identified race. Residents identifying as URM were consistently scored lower than White residents for all competency domains, while Asian residents scored lower in PC, MK, SBP, PBLI, and ICS domains (Table 3). Mediation analysis revealed that satisfaction with support had a small (range 0.01–0.02, $P < .05$ for all), but significant mediating effect on the predication of milestone scores based on URM status in PC, MK, SBP, and ICS domains. Because there were not differences in satisfaction by gender, we did not examine gender differences in performance.

DISCUSSION

The majority of pediatric residents in this national sample reported satisfaction with support from colleagues and faculty, and resident perception of support correlated with resident performance in some domains. We also found racial inequities in satisfaction with support and milestone scores. Dissatisfaction with colleague and faculty support was associated with significantly lower scores across most competency domains. Consistent with previous knowledge regarding inequities in educational assessments,^{21,27} URM residents were scored slightly but significantly lower on milestones-based competency assessments compared to White peers. Mediation analysis documented that lower rates of URM support satisfaction independently correlated with performance scores. While the academic significance of these small differences is unclear, a previous study demonstrated a 0.15 mean difference in PGY1 mean competency score from Fall to Spring in a

single year of observation, suggesting that even small interyear variation may indicate professional growth.²⁸

Resident perspectives of support in this study likely represent many dimensions of support, including a sense of inclusion and belonging, trust, respect, kindness, resources, and time. Numerous factors intrinsic to programs could influence these aspects of support. For example, we found differences in colleague support based on program size. Larger programs could allow for more opportunities to meet people with similar backgrounds and experiences, or more “operational” personnel support, that is, more robust sick call coverage and ability to trade shifts for personal and life conflicts. As our study demonstrated, residents may feel discordant levels of support from peers, faculty and other health care colleagues. For example, racial differences in support satisfaction were most significant for faculty support. This may relate to obvious issues, for example, URM trainees and physicians having fewer mentorship opportunities compared to White peers,²⁹ but may also indicate problems that have not yet been described. Finally, the experience of feeling supported can be considered at different levels—individual relationships, work-unit, program, and institutional or systemic levels. Future research should include development of validated tools to delineate and examine elements of program support to be used in assessing interventions.

While satisfaction with *colleague* support was associated with higher performance scores in all domains except MK, we found no association between performance scores and *faculty* support when examining the entire pool of resident participants. Differences in the nature of resident-faculty and peer relationships may explain this finding. Faculty interactions may be intermittent and focused on supervision and teaching, while residents often serve as teammates, friends, and confidants longitudinally and outside of work settings.

Table 3. PGY1 Adjusted* Mean Core Competency Scores, Race

		Adjusted Mean Competency Score	P Value
Patient care	White	3.25	ref
	Asian	3.19	.001
	URM	3.16	.000
Medical Knowledge	White	3.23	ref
	Asian	3.18	.010
	URM	3.13	.000
System-based practice	White	3.14	ref
	Asian	3.09	.03
	URM	3.07	.000
Practice-based learning and improvement	White	3.13	ref
	Asian	3.08	.04
	URM	3.07	.006
Professionalism	White	3.37	ref
	Asian	3.34	.18
	URM	3.31	.001
Interpersonal Communication Skills	White	3.35	ref
	Asian	3.31	.046
	URM	3.31	.04

URM indicates underrepresented in medicine; PGY, post-graduate year.

P value compares mean competency score to white resident mean competency score.

*Adjusting for clustering in programs, data collection cycle, and PGY.

Table 4. Linear Mixed-Effects Model, Comparing PGY1 Competency Scores by Dissatisfied Versus Neutral or Satisfied Responses

	Competency	Dissatisfied	Neutral or Satisfied	Δ	<i>P</i>
Colleague support	ICS core	2.77	2.98	-0.21	.02*
	ICS 1	2.82	3.01	-0.19	.0496*
	ICS 2	2.71	2.96	-0.25	.02*
	MK core	2.60	2.77	-0.17	.01*
	PBLI core	2.62	2.77	-0.15	.07
	PC core	2.59	2.81	-0.22	.000*
	PC1	2.66	2.85	-0.19	.04*
	PC2	2.59	2.85	-0.26	.002*
	PC3	2.59	2.80	-0.21	.03*
	PC4	2.57	2.76	-0.19	.03*
	PC5	2.57	2.81	-0.24	.01*
	PROF core	2.87	3.08	-0.21	.001*
	PROF1	3.02	3.19	-0.17	.36
	PROF2	2.96	3.17	-0.21	.02*
	PROF3	2.96	3.14	-0.18	.03*
	PROF4	2.86	3.13	-0.27	.01*
	PROF5	2.78	3.04	-0.26	.01*
	PROF6	2.70	2.88	-0.18	.03*
	SBP core	2.60	2.73	-0.13	.03*
	Faculty support	ICS core	2.85	2.99	-0.14
ICS1		2.91	3.01	-0.10	.03*
ICS2		2.8	2.97	-0.17	.01*
MK core		2.69	2.78	-0.09	.04*
PBLI core		2.66	2.78	-0.12	.02*
PC core		2.69	2.82	-0.13	.002*
PC1		2.76	2.85	-0.09	.15
PC2		2.74	2.85	-0.11	.05
PC3		2.64	2.82	-0.18	.01*
PC4		2.65	2.77	-0.11	.01*
PC5		2.67	2.83	-0.16	.01*
PROF core		2.97	3.09	-0.12	.002*
PROF1		3.12	3.19	-0.07	.44
PROF2		3.09	3.17	-0.08	.1
PROF3		3.04	3.15	-0.11	.05
PROF4		3.00	3.13	-0.13	.01*
PROF5	2.90	3.04	-0.14	.001*	
PROF6	2.78	2.88	-0.10	.02*	
SBP core	2.65	2.74	-0.08	.33	

PC indicates Patient care; MK, Medical Knowledge; SBP, System-based practice; PBLI, Practice-based learning and improvement; PROF, Professionalism; PGY, post-graduate year; and ICS, Interpersonal Communication Skills.

Δ = the change in milestone score comparing dissatisfied residents to satisfied or neutral residents.

Linear mixed-effects model including fixed effects of race (White, Asian, URM), resident year, faculty, and colleague support (as main effects and in interaction with resident year), type of residency program (categorical, med/peds, or combined, as a main effect an interaction with resident year), random intercepts for learner and program, and a random slope for resident year within program.

**P* < .05.

There is a need to more intentionally explore the relationship between the different psychosocial aspects of the CLE and resident assessments.^{1,2} Though teamwork, resident peer collaboration, and accessibility of supervisors have been associated with job satisfaction,⁸ few studies to date have examined whether peer or supervisory support have differing types of impact on learning and professional development. Resident dissatisfaction may be a harbinger of more serious issues at the individual resident level, such as inadequately controlled mental health diagnoses or social isolation; both having potential impacts on resident performance. Future studies could also include the impact of other support systems, such as spouse, family, and community.

It is notable that feeling supported was not associated with accelerated growth in performance scores over time. Without baseline data for performance prior to residency,

it cannot be determined whether higher PGY1 Spring milestone scores represent a baseline of higher achievement, or significant growth in intern year. It is possible that residents with strong social skills develop closer peer and faculty relationships, and receive higher scores than their peers at baseline. Alternatively, the impact of resident support may be most influential during intern year, when the foundation of residency performance is formed. Because perceived organizational support is an established factor in promoting job satisfaction in the organizational psychology literature,^{10,11} correlated with higher academic performance in medical school and residency in our study and others,^{6,14} it may be an important target for measuring and improving the CLE.

Diversity, equity, and inclusion are cited as priorities of the ACGME³⁰ and many training programs, yet data

continue to support persistent racial inequities academic medicine and medical education. Racial inequities are the result of structural racism, which may be manifested as explicit and implicit bias, harassment and microaggressions from patients, peers, and supervisors,^{20,31} lack of representation during training, practice and in program and institutional leadership,³² and experiences of feeling othered and excluded.^{16,17} The different experiences of program support among URM and Asian residents suggest inequities in the psychosocial aspects of the CLE that should be addressed through programs like ACGME Clinical Learning Environment Review, particularly for Asian and URM residents.

Our finding that URM residents scored lower on milestone competency measures compared to peers is consistent with previous studies.³³ While we cannot determine causality in this relationship, there are several potential hypotheses. First, feeling unsupported could contribute to poorer performance. An example of this is stereotype threat, in which test performance is impacted by learners' worry about confirming a negative stereotype.³⁴ Though this classically has been described related to gender and race-based performance differences, it could also apply to residents who have historically struggled with evaluations and testing. Another potential explanation is that performance and feeling supported interact more like a feedback loop than a unidirectional relationship. For example, a resident who feels unsupported by faculty may have a negative relationship with such faculty, impacting faculty evaluations of residents. In addition, once a resident is scored or evaluated poorly, negative perceptions may be perpetuated within a group of faculty, leading to additional low scores. Finally, systematic and structural issues related to race must be further explored, including problems with the measurement tool,³⁵ such as the possibility that questions and prompts promote evaluation bias.²⁷ Finally, bias, stereotyping or explicit racism on the part of the evaluator may have contributed to the score inequities.

Our findings suggest that resident perceptions of support are essential components of a healthy learning environment. Programs should prioritize strategies to address program support and related racial inequities in the CLE. Programs may even consider poor performance as a marker for perceived lack of support, and address support in individualized education plans. Programs and governing organizations must commit to fostering inclusive environments where *all* residents feel a sense of belonging. This work will not be easy, and requires examining White hegemony, normativity, privilege, and supremacy in medical education and health care,³⁶ and recognizing medical education's complicity in the perpetuation of racial inequities.

To address these inequities, programs can start by more seriously investing in workforce diversity. Ganzaga et al suggest 4 actions to promote a diverse workforce: make diversity a priority, seek out diverse candidates, implement inclusive recruitment practices, and build the pipeline.³⁷ It is important that these efforts occur not only during resident recruitment, but also at the faculty

and programmatic leadership level, recognizing the importance of representation and mentorship. Second, is striving for equity in academic medical educational outcomes and recognizing that systematic racism is the cause of racialized inequality in medical education. Policies and procedures must be the foundation of equity efforts including: accessible and anonymous method of reporting racism, bias, and harassment that prevent retaliation and ensure appropriate follow-up, examination of bias and racism in the process of hiring and promoting faculty and residents further investigation into the biases that may exist in assessments such as milestone-based competencies, and whether specific milestone language promotes stereotypic expectations. Finally, targeted mentoring programs and resource or affinity groups for URM and Asian residents to find support may help foster more feelings of inclusion and belonging for URM and Asian residents.³⁸

There are several important limitations to this study. Though the 60% response rate is high for a survey-based study, we do not have data from 40% of the residents in participating programs, leaving the possibility of nonresponse bias. Although this study represents a large number of residents from a diverse consortium of programs, there could be bias from recruiting programs with an inherent interest in resident well-being. Because of the large number of participants in the study, it is possible that statistically significant but small differences in satisfaction and performance are not academically significant. Inherent to a cohort study, we cannot determine causality, such that there may be other mediating factors impacting support and performance. Because "support" is not defined in the survey, resident responses could indicate differing interpretations. Our understanding of URM trainee experiences was limited by insufficient racial and ethnic diversity in the resident sample. We did not examine other important elements of diversity such as Lesbian, Gay, Bisexual, Transgender, and Queer identities, physical abilities, culture, or primary language.

Though programs submit milestones assessment reports to the ACGME as determined by the CCC, they are subject to assessor bias and interprogram variability. Final reports may be based on averages of milestones-based assessment scores from rotations, assessment by a designated CCC expert reviewer, scores assigned during CCC discussions, or by a combination of techniques. Data sources may also vary by subcompetency. For example, the MK subcompetency score may be derived from performance during experiences specifically designed to engage a resident in evaluating and applying evidence-based medicine. Though milestone assessments are currently the standard for pediatric residency programs in measuring clinical competency based on the reporting standards of the ACGME and ABP joint Milestones Project. It is possible that an approach based on Entrustable Professional Activities or other paradigms could have less bias. Future studies should examine paradigms that minimize bias in assessment.

CONCLUSIONS

This secondary analysis of a large, diverse prospective study of pediatric residents and residency programs demonstrated multiple associations between resident perception of support and resident performance. Future studies should assess more granular aspects of support to determine actionable interventions, collect baseline data before residents begin their graduate medical education, and specifically seek a more racially diverse sample to better understand the experiences of URM trainees.

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SUPPLEMENTARY DATA

Supplementary data related to this article can be found online at <https://doi.org/10.1016/j.acap.2020.08.009>.

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