

The Assessment of Leadership Competencies in First-Year Undergraduate Medical Students

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Abstract

This study aimed to assess the views and leadership competencies of incoming medical students and determine whether leadership traits predicted patient-centeredness in these students. Incoming medical students at one institution from 2017-2020 (N=428) completed a Leadership Needs Assessment assessing self-reported ability and the importance of competency in teamwork, selfless service, integrity, critical thinking, and emotional intelligence. Participants in the entering class of 2020 (n=92) also completed the Johns Hopkins University Patient-Centeredness Assessment to evaluate patient-centered attitudes. This cohort repeated both surveys at the completion of the first year to assess for changes in the perceived importance of leadership qualities, self-reported competencies, and patient-centeredness. Participants self-reported the highest competency (mean, SD) in integrity (7.92, 1.19) and the lowest in critical thinking (6.59, 1.12). Leadership Development Opportunity (difference between leadership expectation and self-reported ability) was largest in teamwork (2.31, 1.11) and smallest in integrity (0.97, 1.18). Post-first-year assessments were compared in the 2020 cohort, and statistically significant increases (mean, p-value) were found in critical thinking (0.31, $p<0.01$), emotional intelligence (0.18, $p<0.03$), and patient-centeredness (0.92, $p<0.05$). Patient-centeredness was positively predicted by integrity and negatively predicted by critical thinking. Incoming medical students highly value leadership and enter medical school with a robust self-reported ability level. Our data suggest that integrity may increase patient-centeredness and that incoming medical students perceive teamwork as the greatest area for leadership competency development. Further research is needed to determine the best curricula to develop leadership competencies and increase patient-centeredness.

Keywords: leadership competencies, leadership, training, patient-centered, emotional intelligence

1. Introduction

In recent years, leadership competency has become an essential aspect of medical training and practice (Baggs et al., 1999; Clemmer et al., 1999; Corrigan et al., 2000; Kim et al., 2010; Neily et al., 2010). As modern healthcare systems have become increasingly complex, physicians are expected to both navigate rapidly evolving medical practices and lead

multidisciplinary patient care teams. Skills such as motivational interviewing, critical thinking, team building, strategic planning and development, conflict resolution, and negotiation are now essential for success for the modern-day physician. (McKimm & Swanwick, 2011; Stoller, 2009). For these reasons, academic medical centers should be responsible for developing their trainees into competent and effective ethical leaders (Kohn, 2003). Despite this, there is a lack of formal education dedicated to cultivating healthcare leadership skills in undergraduate medical students.

Historically, leadership was learned via lived experiences and observation of role models; however, research demonstrates that leadership abilities can be taught and learned, similar to other didactic skills (Ayeleke et al., 2019). Healthcare leadership development has been found to be most effective when it is comprehensive, interdisciplinary, and takes place over time; starting leadership training early in medical school has been shown to be successful in developing future physician-leaders (Abbas et al., 2011; Crites et al., 2008; Sonnino, 2016; Stringfellow et al., 2015; Varkey et al., 2009). Unfortunately, the lack of formal leadership curricula and dedicated training programs (Lerman & Jameson, 2018; Neeley et al., 2017) has left medical trainees feeling underprepared for the leadership roles they eventually assume (Hana & Rudebeck, 2011; McKimm & Swanwick, 2011; Onyura et al., 2019; Quinn & Perelli, 2016).

In recent years, some institutions have begun to emphasize intentional leadership development through dedicated training programs (Bonazza et al., 2021; Doty & Taylor, 2019; Sultan et al., 2019; Webb et al., 2014). However, these programs are heterogeneous and lack consensus on how to best cultivate leadership skills (Neeley et al., 2017). Before leadership curricula can be standardized and effectively implemented for medical trainees, it is important to critically assess the population's baseline leadership competency and expectation for development (Crites et al., 2008; Hana & Rudebeck, 2011; Kumar et al., 2020; Onyura et al., 2019; Quinn & Perelli, 2016; Sultan et al., 2019; Webb et al., 2014). Understanding these factors will allow educators to develop curricula that both address broad themes and target specific trainee needs.

The Duke University School of Medicine created an integrated approach to leadership integration within its current curriculum. The Duke Healthcare Leadership Model was developed based on competencies that are vital to effective healthcare leadership, including teamwork, selfless service, integrity, critical thinking, and emotional intelligence, all contributing to the core principle of patient-centeredness (Hargett et al., 2017). (Figure 1) Based on this model, a four-year Leadership Education and Development (LEAD) program was created to fit seamlessly into Duke's existing medical curriculum. The first two years of the LEAD program focused on acquiring and building the foundations of these core competencies. The final two years of the curriculum provided opportunities for students to further develop these skills through a variety of active leadership roles. These core competencies provide an effective framework to categorize and comprehend leadership education (Anderson et al., 2017; Nosé et al., 2021).

To our knowledge, there is a lack of standardized assessments to evaluate leadership

competency and leadership needs among first-year medical students. Therefore, the primary aim of this study is to assess the views of incoming medical students regarding the importance of leadership competencies as well as their own personal ability in these areas. Secondary aims of this study explored whether self-reported leadership ability changed over the course of the first year of medical school and whether self-reported leadership ability could predict patient-centeredness.

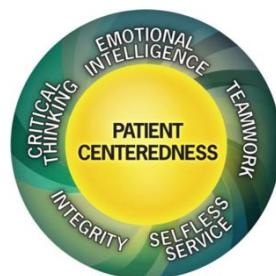


Figure I. The Duke Healthcare Leadership Model (Hargett et al., 2017).

2. Methods

2.1 Study Design

This study was determined exempt from institutional review board approval after initial review (Pro00106589). A cross-sectional design was used in which study participants were recruited from incoming classes of medical students (N=428) at one United States medical school from July 2017 – July 2020. By virtue of enrolling in the School of Medicine, all incoming first-year students were eligible for the study. All participants were asked to complete one survey at the beginning of their first year and retake the same survey at the end of their first year of medical school. This survey, described below, assessed their ability in each of the five core competencies of leadership as well as the perceived need for leadership training. We performed this pre-/post-first-year survey for the incoming medical school classes of 2017, 2018, 2019, and 2020. The final class of participants, incoming class of 2020, also completed a separate questionnaire assessing patient-centeredness at both time points. Scores from both assessment tools for all participants were collected and analyzed.

2.2 Assessment Tools

We utilized two separate assessment tools to determine leadership needs as well as correlation with patient-centeredness. The Leadership Needs Assessment (LNA) is a survey tool created by the study team to identify the values, strengths, and areas of development within the leadership core competencies and overall patient-centeredness. A previously published tool, the Johns Hopkins University Patient-Centeredness Assessment (JHUPCA), was used in the incoming class of 2020 to correlate the LNA results with a dedicated patient-centeredness assessment. While neither assessment tool has been formally validated, there is face validity in the LNA, and prior literature has described the value of the JHUPCA.

2.2.1 Leadership Needs Assessment

This 29-item questionnaire was developed to directly assess the leadership capabilities and

expectations of medical trainees. The tool asks participants to rate the ability of an ideal leader as well as their own level of competency in these areas. Each item was scored on a scale of 0-10 with 0 being “Completely Lacking” and 10 being “Complete Mastery”. Each item was designed to match one predominant core competency from the Duke Healthcare Leadership Model (Hargett et al., 2017). (Table I)

Table I. The Leadership Needs Assessment and corresponding core competencies

Critical Thinking	Emotional Intelligence	Integrity	Teamwork	Selfless Service
Quality: Strong knowledge base in area of study	Quality: Adapting to change	Quality: Honesty	Quality: Reliability	Quality: Service to others
Quality: Holistic Thinking (thinking analytically and conceptually to solve a problem)	Quality: Compassion	Quality: Fairness	Quality: Accountability	Quality: Giving credit without seeking it
Quality: Openness to new ideas	Quality: Building and maintaining relationships		Quality: Being motivational/inspirational	Quality: Humility
Quality: Applying knowledge and evidence (applying evidence-based practice to improve outcomes)	Quality: Effective communication		Quality: Managing others	
Quality: Love of learning	Quality: Maintaining personal balance		Quality: Maximizing team dynamics	
Quality: Decisiveness			Quality: Cultivating Resilience	
			Quality: Fostering vision	

2.2.2 Patient-Centeredness Assessment

This 9-item survey, previously used by Beach et al. at Johns Hopkins University School of Medicine, presents a 5-point Likert Scale, with 1 = strongly disagree, 3 = neutral, and 5 = strongly agree, to assess patient-centeredness (Beach et al., 2007). (Table II)

Table II. The Johns Hopkins University Patient-Centeredness Assessment

Johns Hopkins University Patient-Centeredness Assessment

1. Physicians need to “know where their patients are coming from” in order to treat their medical problems.
 2. A patient’s background and culture, while worth noting, are not critical issues to explore in treating illness.
 3. I have a genuine interest in patients as people, apart from their disease.
 4. Patients usually know what is wrong with them.
 5. Patients should always be given choice between medical treatments.
 6. Patients should always be given information about their medical conditions.
 7. Patients cannot get good care from a physician who does not entirely respect them.
 8. An important part of my role as a future physician is to provide emotional acceptance and empathy to patients.
 9. Physicians should not allow patients to see their emotions.
-

2.3 Statistical Analyses

Surveys were distributed to each class of first-year medical students via Qualtrics International Inc (Provo, UT, <https://www.qualtrics.com>) at the beginning of the academic year. Data was collected and blinded prior to analysis. Statistical analyses were completed using SAS University Edition (Cary, NC). LNA items were grouped and summed by core competency. Given the variable number of items pertaining to each core competency, averages were calculated to give an aggregate score for each core competency. As described above, the highest possible mean score would be 10 for each core competency, and the lowest would be 0. The aggregate scores for each core competency were compared via Analysis of Variance and F-Tests for both student self-assessment and importance for leaders to possess or “leadership expectation”. Differences between self-assessment and leadership expectation were also calculated to assess the gap in perceived leadership abilities, which we labeled “Leadership Development Opportunity” for each specific core competency. Tukey’s post-hoc test was used to determine individual differences between the core competencies in each domain (self-reported, leadership expectation, and Leadership Development Opportunity).

For participants who completed the JHUPCA (n=92), answers were summed and then multiplied by a factor of 2.222 to obtain a composite patient-centeredness score on a scale out of 100 (Beach et al., 2007). Univariate and multivariate linear regression models were built to assess whether core competency aggregate scores predicted patient-centeredness scores. Missing values within this subset (n=92) were imputed using the single mean imputation method. The pre- and post-first-year scores of core competency aggregates and patient-centeredness were calculated and compared using paired Student’s t-tests.

3. Results

3.1 Total Cohort (2017-2020) Description

Our final cohort included 428 first-year medical students. Participants self-reported the highest competency (mean, SD) in integrity (7.92, 1.19) and the lowest competency in critical thinking (6.59, 1.12). However, participants reported the most important competency for leaders to have as emotional intelligence (8.94, 0.80), with the least important being selfless service (8.40, 1.22). (Figure II) Leadership Development Opportunity (difference between leadership expectation and self-reported ability) was highest in teamwork (2.31, 1.11) and lowest in integrity (0.97, 1.18). (Figure III)

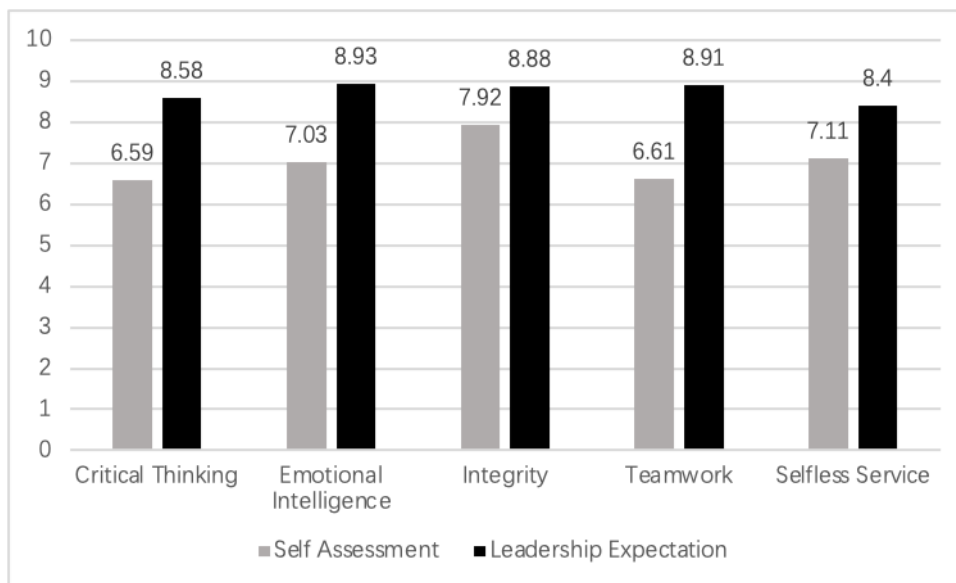


Figure II. Comparison of Self-Assessment and Leadership Expectation among the Five Leadership Core Competencies

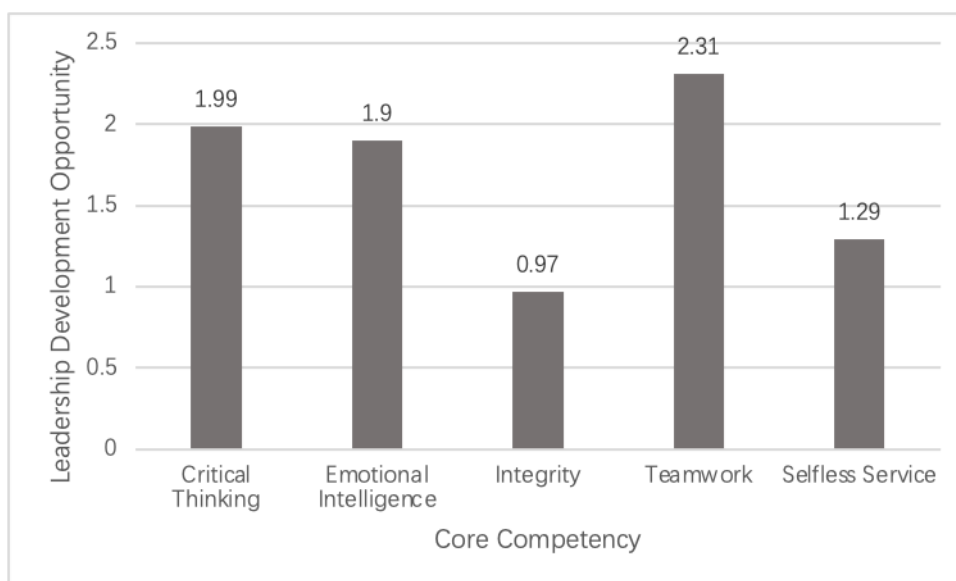


Figure III. Leadership Development Opportunity for the Five Leadership Core Competencies

3.2 Core Competencies

Overall differences between self-reported core competency scores were statistically significant ($p < 0.05$) except for the comparison of selfless service vs. emotional intelligence and critical thinking vs. teamwork. Overall differences in core competency scores in the leadership expectation domain were significantly different ($p < 0.05$) except for emotional intelligence vs. teamwork, emotional intelligence vs. integrity, teamwork vs. integrity, and selfless service vs. critical thinking. Self-assessment and leadership expectation core competency aggregate scores did not significantly change when compared between the incoming classes. (Tables III & IV)

Table III. The Self-Assessment of Leadership Core Competencies Aggregate Score by Incoming Class

Leadership Competency	2017	2018	2019	2020	p-value
Critical Thinking	6.38	6.61	6.69	6.71	0.114
Emotional Intelligence	7.09	7.02	7.00	7.01	0.934
Integrity	7.96	7.88	7.94	7.90	0.949
Teamwork	6.58	6.52	6.60	6.73	0.641
Selfless Service	7.18	7.09	7.13	7.05	0.899

Table IV. The Leadership Expectation of Core Competency Aggregate Scores by Incoming Class

Leadership Competency	2017	2018	2019	2020	p-value
Critical Thinking	8.71	8.59	8.56	8.47	0.307
Emotional Intelligence	8.94	8.93	8.97	8.91	0.954
Integrity	8.66	8.91	8.97	9.04	0.052
Teamwork	8.82	8.87	9.03	8.93	0.275
Selfless Service	8.42	8.14	8.52	8.50	0.099

3.3 Leadership Development Opportunity

Overall differences in Leadership Development Opportunity were significantly different in each core competency ($p < 0.05$) except for critical thinking vs. emotional intelligence. When compared between each incoming class, the Leadership Development Opportunity was significantly different for critical thinking ($p < 0.05$) and integrity ($p = 0.03$). The Leadership Development Opportunity in critical thinking decreased in later incoming classes (Figure IV), while integrity had an increased Leadership Development Opportunity in later incoming classes. (Figure V)

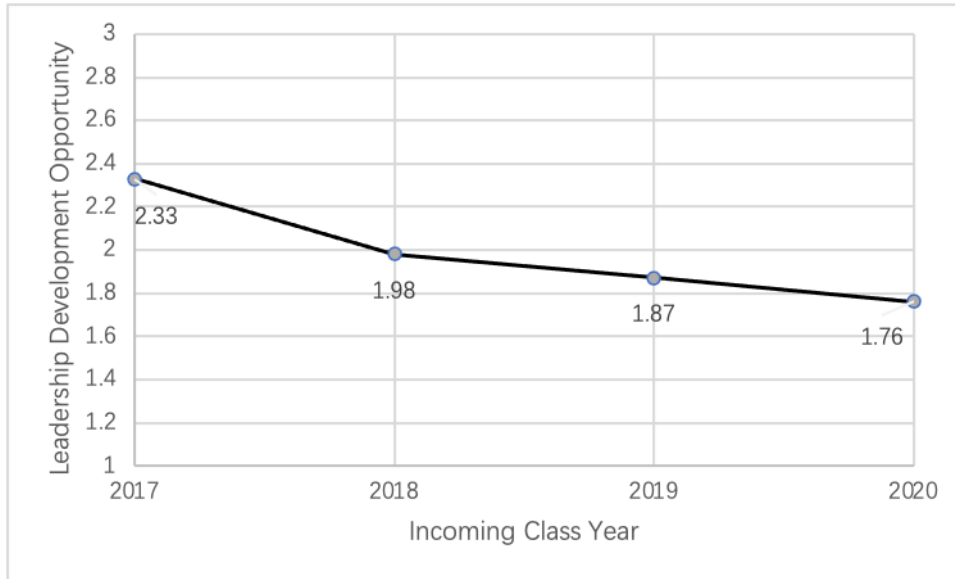


Figure IV. Leadership Development Opportunity for Critical Thinking between Incoming Class Years

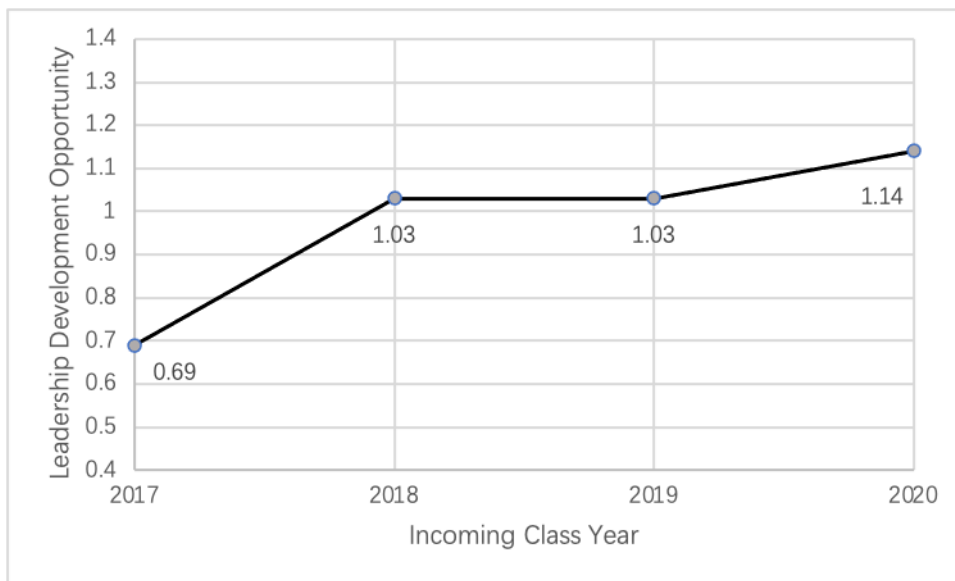


Figure V. Leadership Development Opportunity for Integrity between Incoming Class Years

3.4 Incoming Class of 2020

The incoming class of 2020 had 92 participants who completed both assessments, LNA and JHUPCA, pre- and post-first-year. When comparing pre-post assessments, statistically significant increases (mean, p-value) were found in self-reported ability in the core competencies of critical thinking (0.31, <0.01), emotional intelligence (0.18, 0.03), teamwork (0.72, <0.01), and the core principle of patient-centeredness (0.92, 0.05). (Figure VI)

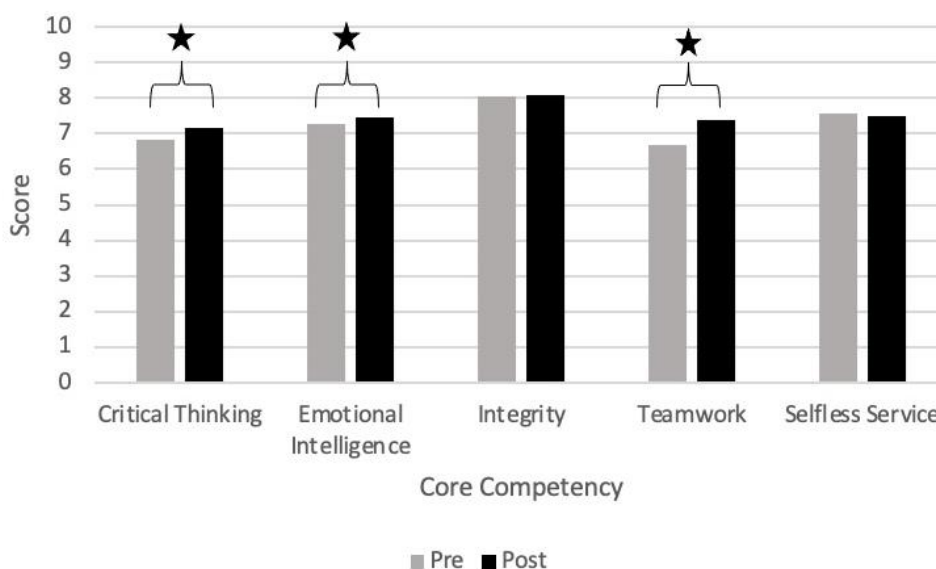


Figure VI. Change in Self-Assessment of the Five Leadership Core Competencies of the 2020 Incoming Class

3.5 Patient-Centeredness

Critical thinking and integrity significantly predicted patient-centeredness in the multivariate regression model ($p < 0.05$). For every unit increase in critical thinking, there is 1.49 unit decrease in the patient-centeredness score, adjusting for other core competencies ($p=0.021$). For every unit increase in integrity, there is a 1.23 unit increase in patient-centeredness score, adjusting for the other core competencies ($p=0.012$). (Table V)

Table V. The effect of Leadership Core Competencies on Patient-Centeredness

Leadership Competency	Change in Patient-Centeredness Score	p-value
Critical Thinking	-1.49	0.004
Emotional Intelligence	1.27	0.897
Integrity	1.23	0.031
Teamwork	-0.81	0.397
Selfless Service	0.53	0.247

4. Discussion

This study presents a knowledge gap in our understanding of leadership education needs in undergraduate medical education. Currently, no other study has presented incoming medical students' self-assessment of leadership strengths and weaknesses or identified perceived gaps in leadership competencies. Our data suggest that the leadership core competencies of critical thinking and integrity predicted patient-centeredness, medical students had room to grow in leadership skills (specifically related to teamwork), and medical students generally entered medical school with a high baseline level of self-reported leadership ability.

4.1 Patient-Centeredness

Our most important finding was that critical thinking and integrity significantly predicted patient-centeredness. Specifically, increases in critical thinking scores led to decreased patient-centeredness, while increases in integrity led to increased patient-centeredness. The reasons for these trends are likely multifactorial. One explanation could be that an increased educational focus on the biomedical aspects of disease may distract students from holistic patient care, inadvertently reducing the emphasis on interpersonal skills (Bargh, 1984; Branden, 1999; Langer, 2020). This may inappropriately demonstrate that holistic patient-centeredness is not as vital or important for patient care (De Boer et al., 2013; Piper, 1993). Alternatively, students may feel disconnected from patient care at the end of a year that is primarily didactic. As critical thinking is a vital part of physician training, it will be important to institute intentional training to ensure that improvements in this core competency do not contribute to decreased patient-centeredness. While our data suggest that improving integrity may offset decreases in patient-centeredness, this core competency also had the lowest Leadership Development Opportunity score, implying that students felt as though they needed the least development in this area. Additional research is therefore needed to explore effective methods to improve holistic patient-centeredness among medical students in the setting of developing their skills to think critically and problem-solve.

4.2 Leadership Development Opportunities

In addition to our findings on patient-centeredness, we observed that the core competency with the biggest perceived ability gap was teamwork. Given the multi-disciplinary nature of medicine, teamwork is a critical skill, and it is important that trainees feel confident in their abilities in this area. Our data support that leadership curricula should focus on providing students with opportunities to learn, develop, and master skills that will make them effective team members throughout medical education. Previous research has shown that team-based learning with associated reflection and feedback improve both teamwork and leadership skills while also increasing content mastery in undergraduate medical education (Alizadeh et al., 2018; Koles et al., 2010). We would suggest that further emphasis on this practice as well as others that promote working in team-based situations are vitally important in undergraduate medical curricula to best address the needs of incoming medical students.

Finally, our survey allowed us to assess perceived leadership skill level across various competencies. Medical students clearly felt confident in many of these competencies, as the lowest score for any competency was a 7 out of 10. This finding suggests that it may be more important for leadership curricula to focus on teaching students to use their baseline skills to improve patient care rather than simply increasing their absolute competency level. Hunziker et al. demonstrated the effectiveness of this approach when they reported that teams of medical students shown a short leadership instructional video had improved performance in cardiopulmonary resuscitation simulations as compared to teams shown a video on technical intervention skills (Hunziker et al., 2011). Therefore, future leadership curricula that focus on ways to integrate skills directly into clinical contexts may be most beneficial to students.

4.3 Limitations

There were several limitations in our study. First, our study only included one undergraduate medical institution, so our participants may not be representative of all undergraduate medical students. Second, given that self-assessment is inherently subjective, our data are subject to reporting bias and may be measurements of student self-perception rather than objective leadership skills (Dunning et al., 2004). Third, the LNA used has not been internally validated. However, we believe that this was the best tool available to accomplish our goals for this study, as it modeled after a previously validated leadership assessment tool specific to healthcare (Murphy et al., 2016). Statistically, our multivariate regression model did not account for leadership activities or experiences that would cultivate patient-centeredness before medical school. Similarly, leadership development opportunities over the first year of medical school are not fully standardized, so some students may have exposure to optional extracurricular activities that could differentially affect leadership development.

5. Conclusions

Incoming medical students begin their medical education self-reporting high levels of leadership competencies, with the highest in integrity and lowest in critical thinking. In our analysis, integrity was found to positively influence patient-centeredness, while critical thinking was shown to make a negative impact. The greatest Leadership Development Opportunity was present in teamwork. As teamwork is an essential and necessary skill for success in the current healthcare environment, this highlights a potential high-yield domain in which medical training programs should focus their leadership education efforts. Future leadership curricula should, however, include dedicated training in each leadership skill as our data show that incoming medical trainees have areas for growth within each core competency. Further research is needed to explore the best educational avenues for teaching these competencies to undergraduate medical students.

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