



Analysis of leadership intelligence among healthcare workers in the Department of Head and Neck Surgery and Communications Sciences

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ABSTRACT

Purpose: To analyze 360- evaluation scores of the Professionalism Intelligence Model within an academic surgical department.

Methods: A leadership course was introduced within the Department of Head and Neck Surgery & Communication Sciences at Duke University Medical Center. A 360 evaluation assessing domains of the Professional Intelligence Model was recorded for all participants. Participant demographics included gender (male vs female), generation group (generation Y vs older generations) and physician status (physician vs non-physician). Differences in mean self-scores were modeled using linear regression model. When analyzing the evaluator scores, gaps were defined as self-score minus evaluator-score for each member of a participant's evaluator groupings (supervisor, peer, and direct report). Two types of linear mixed models were fit with a random intercept to account for the correlated gaps in the same participant.

Results: Scores of 50 participants and 394 evaluators were analyzed. The average age was 40.6 (standard deviation 9.3) years and 50% of participants were females. Physicians accounted for 36% of the entire cohort and 61% of physicians were residents. Physicians scored themselves significantly lower than non-physicians when assessing leadership intelligence, interpersonal relations, empathy, and focused thinking. On average, participants under-rated themselves compared to their evaluators with direct reports giving higher scores than managers and peers. When compared with generation Y, older Generations tended to rate themselves lower than their peers and managers in cognitive intelligence. No significant association was observed between gender and any scores.

Conclusion: Participants rate themselves lower on average than their evaluators. This work is important in understanding how perceived leadership skills and qualities are assessed and developed with an academic surgical department.

BACKGROUND

Due to numerous challenges, regulatory issues, and rapid changes facing the delivery of medical care, health care institutions have seen a remarkable growth of leadership development programs with a particular focus on physicians and nurses¹⁻⁴. These initiatives improved health care quality and cost by reducing clinical errors, mortality rates and lengths of hospitalization⁵⁻⁷. However, most of these programs speak of leadership development while they refer to individual leader development. The terms “leader” and “leadership” development are often used interchangeably with no distinction between them⁸. In fact, leadership is a complex phenomenon that encompasses the interactions between the leader and the social and organizational environment^{9,10}. Additionally, the authors of a systematic review of leadership development programs for physicians noticed a lack of programs that integrate non-physicians and physicians professionals³, all of whom are involved in patients’ interaction in a healthcare facility.

To address this issue, a Leadership Lived Out (LLO) course was introduced in the Department of Head and Neck Surgery & Communication Sciences at Duke University Medical Center. This yearlong program has a patient centered approach and is tailored to all staff members including physicians, clinic and operating room nurses, trainees, administrators, and staff. As part of the program, the cohort of participants (range7-10/year) completed a self and 360 assessment called the Professionalism Quotient Inventory (PQ-I) based on the Professionalism Intelligence Model (PIM)¹¹. The PQ-I assesses behaviors related to the three domains of Cognitive intelligence, Emotional intelligence, and Leadership intelligence. Our primary objective is to analyze the association between gaps in self-score and 360-score for each PIM domain as it relates to healthcare team roles, gender, and generational group. Personal coaching is part of LLO and is focused on the feedback obtained from the PQ-I.

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METHODS

IRB exemption was declared from Duke University Medical Center Institutional Review Board. Participants who completed the PQ-I were included in this study.

Data collection and management:

The PQ-I involves participants completing questions about themselves based on their perception. The PQ-I 360 is a multi-rater measure about the participant completed by those that they report to (manager), those considered at the same level (peers), and those that they either supervise (direct reports). All PQ-I 360 raters are anonymous and pooled by group (manager, peers, direct reports). Suggested raters are provided by the participant. The final report combines a self-evaluation with that of the raters, providing comparison of the overall Professionalism Intelligence capabilities. The PQ-I questionnaire was completed by each participant approximately 3 months into the program. The primary outcomes were gaps in the self-score and work-score, defined as the difference between self-score and work-score for each member of the work evaluator who provided a score to the participant. The scores were measured in 3 domains and 15 subdomains (Figure 1). The exposures of interest included participant's age (generational groups), gender (male vs female), and physician status (physician vs non-physician). Participants were divided into two generational groups: Older Generation (born before 1981), and Generation Y (1982-2001).

Statistical analysis:

Participant's characteristics were summarized with mean (standard deviation, SD) for age and with frequency (percentage) for gender and categorized by health care role. Participant self-scores were presented with mean and standard deviation. Analyses were performed separately for each domain and subdomain. Differences in mean self-scores between participant genders, generations, and physician status were modeled using linear regression model. Gaps in scores were defined as self-score minus work evaluator-score for each member of a participant's work evaluator. Two types of linear mixed models were fit with a random intercept to account for the correlated gaps in the same participant. The first model contained evaluator role (peer, direct report, or manager/supervisor) as a main effect which allowed us to estimate the gaps in scores for each evaluator role. The second model included evaluator-role, a participant characteristic (age, gender, or physician status), and their cross-products. Contrast statements were used to estimate the difference in gaps between levels of participant characteristics for each evaluator role. Coefficient estimates, β , and their 95% confidence intervals (CI), were reported for each model. All analyses were performed in R 3.6.3 (R Core Team, 2019).

RESULTS

Self-scores:

Self-scores for the three domains are reported by gender, generation, and physician status (Table 2). The self-scores in the domains are similar between gender, generation, and physician status, except for leadership intelligence between physicians and non-physicians. Physicians scored themselves 4.57 points lower than non-physician participants (95% CI: 0.53, 8.62) on average. The analysis of leadership intelligence subdomains showed that both embodiment and empowerment had an inverse association with physician status. While cognitive intelligence and emotional intelligence did not yield any significant association with physician status, some of their subdomains did. In fact, physicians scored themselves significantly lower compared to non-physicians when assessing their interpersonal relationships, empathy, and focused thinking (Figure 2).

Score gaps by evaluator role:

The average gap between self-score and evaluator-score was calculated (self-score) – (evaluator-score) for each type of work evaluator member (Table 3). All coefficient values came back negative, indicating that participants tend to rate themselves lower than their work evaluator members for all domains, regardless of the role of the rater. Direct reports are more likely to rate the participants the highest, and managers/supervisors the lowest, although still higher than the participants rate themselves.

Furthermore, the average gap between self-score and evaluator-score for each type of work evaluator member was estimated separately for each of male and female participants, Older Generation and Generation Y participants, and physician and non-physician participants. The same rating pattern was seen; participants tend to score themselves lower compared to their evaluator members even when the gaps are broken down by gender and physician status. However, there were significant associations between age groups and cognitive intelligence in peers and managers/supervisors (Table 4). Participants from Older Generation on average rate themselves 8.76 points lower than their peers, whereas participants from Generation Y rate themselves only 3.59 points lower than their peers (5.16; 95% CI (0.66, 9.67); p=0.025). Similarly, participants from Older Generation on average rate themselves 6.49 points lower than their managers/supervisors, whereas participants from Generation Y only rate themselves 1.18 points lower than their managers (5.31; 95% CI (0.21, 10.41); p=0.042).

RESULTS

Figure 1: Professionalism intelligence model



Table 1: Participants characteristics

Characteristics	Total (N = 50)
Age, in years, mean (SD)	40.6 (9.3)
Age – categorized	
Baby Boomer	4(8%)
Generation X	26 (52%)
Generation Y	20 (40%)
Male	25 (50%)
Physician	18 (36%)
Attending	7 (38.9%)
Resident	11 (61.1%)

Table 2: Domain self-scores by gender, generation, and physician status

Domain	Female (Reference) N = 25	Male N = 25	β (95% CI)
Cognitive Intelligence			1.16 (-2.40, 4.72)
Mean (SD)	73.8 (6.9)	74.9 (5.6)	
Median (IQR)	75 (69.3 - 78)	73 (72 - 77)	
Min - Max	58 - 84.7	67 - 89	
Emotional intelligence			-0.80 (-4.40, 2.80)
Mean (SD)	77.8 (6.5)	77 (6.2)	
Median (IQR)	77 (74 - 82)	78 (73 - 80.7)	
Min - Max	65 - 91	63.3 - 93	
Leadership intelligence			-0.53 (-4.62, 3.55)
Mean (SD)	78.9 (7.3)	78.4 (7.1)	
Median (IQR)	80 (76.7 - 83.3)	78 (72 - 82.7)	
Min - Max	61.3 - 91.3	67 - 95	
Domain	Older Generation (Reference) N = 30	Generation Y N = 20	β (95% CI)
Cognitive Intelligence			0.91 (-2.74, 4.55)
Mean (SD)	74 (5.9)	74.9 (6.8)	
Median (IQR)	74 (71.5 - 76.8)	73.3 (71 - 78)	
Min - Max	58 - 89	63 - 88	
Emotional intelligence			-2.12 (-5.75, 1.51)
Mean (SD)	78.3 (6.6)	76.2 (5.7)	
Median (IQR)	77.5 (76 - 82)	77 (72 - 80.8)	
Min - Max	65 - 93	63.3 - 93	
Leadership intelligence			-1.64 (-5.78, 2.51)
Mean (SD)	79.3 (7.2)	77.7 (7)	
Median (IQR)	80.5 (78.2 - 83.2)	78 (71 - 82.7)	
Min - Max	61.3 - 95	67 - 91.3	
Domain	Non-Physician (Reference) N = 32	Physician N = 18	β (95% CI)
Cognitive Intelligence			-0.44 (-4.17, 3.28)
Mean (SD)	74.5 (7)	74.1 (4.7)	
Median (IQR)	74.5 (70.8 - 78.8)	73.5 (72 - 78.8)	
Min - Max	58 - 93	67 - 88	
Emotional intelligence			-3.03 (-6.68, 0.62)
Mean (SD)	78.5 (6.4)	75.5 (5.7)	
Median (IQR)	78.3 (75.7 - 82)	76 (70.5 - 79.5)	
Min - Max	65 - 93	63.3 - 87	
Leadership intelligence			-4.57 (-8.62, -0.53)
Mean (SD)	80.3 (7.4)	75.7 (5.6)	
Median (IQR)	81.7 (76.9 - 84.2)	75.3 (70.8 - 80.2)	
Min - Max	61.3 - 95	67 - 86	

Figure 2: Forest plot of differences in Self-scores between non-physicians and physicians

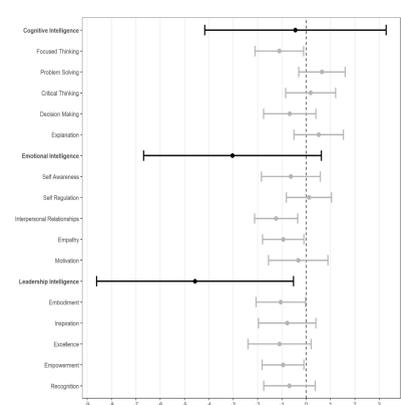


Table 3: β (95% confidence interval) for domain score gaps by evaluator role.

Domain	Peer	Direct Report	Manager/Supervisor
Cognitive Intelligence	-6.76 (-9.02, -4.50)	-7.38 (-9.75, -5.01)	-4.28 (-6.86, -1.71)
Emotional Intelligence	-8.17 (-10.36, -5.97)	-8.8 (-11.09, -6.51)	-6.32 (-8.8, -3.84)
Leadership Intelligence	-6.68 (-9.22, -4.10)	-7.46 (-10.16, -4.77)	-2.99 (-5.94, -0.03)

Table 4: β (95% confidence interval) for domain score gaps by participant age and evaluator role.

Domain	Generation Y	Older Generation	Beta (95% CI) (Gen Y vs Older Gen)	P-value
		Peer		
Cognitive intelligence	-3.59 (-7.11, -0.08)	-8.76 (-11.53, -5.94)	5.16 (0.66, 9.67)	0.025
Emotional intelligence	-7.04 (-10.59, -3.49)	-8.81 (-11.67, -5.96)	1.77 (-2.79, 6.33)	0.440
Leadership intelligence	-3.96 (-8.04, 0.12)	-8.32 (-11.59, -5.05)	4.36 (-0.87, 9.58)	0.101
		Direct Report		
Cognitive intelligence	-6.15 (-9.80, -2.50)	-8.23 (-11.21, -5.26)	2.08 (-2.63, 6.79)	0.382
Emotional intelligence	-9.82 (-13.49, -6.15)	-8.14 (-11.13, -5.15)	-1.68 (-6.41, 3.06)	0.482
Leadership intelligence	-7.42 (-11.67, -3.18)	-7.53 (-10.99, -4.07)	0.10 (-5.37, 5.58)	0.970
		Manager/Supervisor		
Cognitive intelligence	-1.18 (-5.06, 2.70)	-6.49 (-9.80, -3.18)	5.31 (0.21, 10.41)	0.042
Emotional intelligence	-5.80 (-9.46, -1.73)	-8.86 (-10.14, -7.57)	1.26 (-3.82, 6.34)	0.623
Leadership intelligence	0.18 (-4.35, 4.71)	-5.33 (-8.21, -1.46)	5.51 (-0.44, 11.47)	0.069

DISCUSSION

Understanding the perception among the various roles that comprise a healthcare team is important to leadership and professional development. This is the first report of an analysis of 360 evaluations from a leadership program that includes all roles in a healthcare team (i.e. LLO). The results have several observations that deserve consideration in the context of other research findings.

We report that all participants had a lower perception of their leadership, cognitive, and emotional intelligence compared to their evaluator's perception. Prior research has generally shown that under-estimators are rated more favorably on their leadership performance¹². An explanation for the lower self-perception seen is that participants' self-ratings of leadership capabilities decrease from baseline to the end of a program as a result of developing a deeper understanding of leadership. In addition, the challenges faced by the participants when applying their learnings to the workplace could explain low self-ratings^{13,14}. Moreover, humility is an impactful leadership quality that is more dominant in health care settings than in other professional business and more specifically among physicians.

While gender did not yield any significant association with self-scores in this study, Vecchio et al. reported that men have a tendency to over-estimate their effectiveness as leaders compared to women¹⁵. Interestingly, physicians scored themselves significantly lower than non-physicians when assessing their leadership intelligence particularly embodiment and empowerment. Alternatively, the lower rating may be a recognition of needed leadership development. 61% of the physicians in this study were residents. Bent et al. found that most residents in an Otolaryngology department do not consider themselves as good leaders¹⁶. This highlights the importance of incorporating leadership programs into resident's curriculum.

Emotional intelligence is a fundamental component of effective practice and is generating increased interest in the field of health care¹⁷. From hospital administrators to physicians and nurses, collaboration is required not only to improve cost effectiveness of practice but also to ensure patient compliance and satisfaction¹⁸. This characteristic is particularly crucial in physicians who are called for breaking down barrier of communications with patients, in favor of a more empathic approach. McKinley et al. concluded that resident physicians demonstrated a global emotional intelligence similar to that of the general population and called for targeted educational interventions that emphasize different aspects of emotional intelligence¹⁹.

Groups of people born in different time periods develop divergent cultural values and traits, which also manifest in the workplace. Institutions must harness the attributes of each generation to meet the demands of their organization and create effective teams²⁰. There is a paucity of information regarding the generational differences in healthcare except a number of studies assessing those differences in the nursing workforce^{20,21}. The Millennials or Generation Y value teamwork with credits and accomplishments being assigned equally to all members of team. Generation Y emphasizes the notion of belonging to a group that employers who neglect this feature find little success in motivating them²². Older Generations are more likely to view medicine as a job through which they make a living and achieve personal goals rather than an identity²¹. They value a healthy work/life balance and are interested in new skills and technologies.

The Older Generations group was associated with a lower self-rating when relating to work evaluator feedbacks. In contrast, prior studies showed that older managers, as compared to younger managers, tended to over-rate their performance in relation to ratings provided by their supervisors^{15,23-25}. Given that experience comes with age, we could assume that those with longer tenure will provide inflated self-ratings relative to others' ratings. Nonetheless, in the ever-changing landscape of medical industry, health care providers are always seeking viable ways to improve on the patient care they deliver and to keep abreast with the latest development within their specialty.

This is the first study to assess the PQ-I within an academic health care department. The use of a 360-degree feedback proved to be an effecting method for initiating growth and development of leadership acumen^{26,27}. Some authors argue that leadership effectiveness may improve by 60% in programs that rely on 360-degree feedback and coaching²⁸. However, this improvement is dependent on the presence of post-feedback support through leadership development activities²⁸. LLO incorporated both 360 evaluations and also personal coaching focused on these results.

The results of this study should further be considered within the context of potential limitations to this work. We continue to offer the program and intend to further assess these findings. Moreover, the work evaluators were randomly selected from a list of names presented by the participants themselves, leading to selection bias. Finally, raters might be biased towards higher scores to avoid perceived lack of anonymity.

Those in healthcare may under-estimate their leadership, emotional and cognitive intelligence. Having opportunities to gather, review, and incorporate 360 evaluations is an important step in professional and leadership development. This in turn would positively impact patient care outcomes by these teams.

REFERENCES

- HatchemRabbi TB, van der Zwaag AM, Schumann MJ. Leadership mentoring in nursing research, career development and scholarly productivity: A systematic review. *International Journal of Nursing Studies*. 2017;75:21-34. doi:10.1016/j.ijnurstu.2017.07.004
- Tian X, Newkirk B, Durrum A, Weaver S, Botta M. Reimagining Nursing Workforce Development by Strengthening the Leadership Skills of Advanced Practice Nurses. *Journal for Nurses in Professional Development*. 2015;36(3):152-159. doi:10.1097/NND.0000000000000014
- Reinherz AL, Chertok E, Blalock EM. Leadership Development Programs for Physicians: A Systematic Review. *J GEN INTERN MED*. 2016;50(6):674-681. doi:10.1007/s12469-016-0314-1
- Geertz JM, Goodrich AH, Aguirre S. Evidence-based leadership development for physicians: A systematic literature review. *Social Science & Medicine*. 2020;246:112793. doi:10.1016/j.socscimed.2019.112793
- Wasson RH, Anderson RL. Assessment of Self-Other Ratings of Leader Effectiveness in an Academic Setting. *J Gen Intern Med*. 2010;35(2):290-295. doi:10.1111/j.1365-2214.2009.02640.x
- Rosenman EB, Shendrik JK, Rijn JL, Haysle AL, Fernandez R. Leadership Training in Health Care Action Team: A Systematic Review. *Academic Medicine*. 2014;89(5):1295-1306. doi:10.1097/ACM.0b013e3182a0000013
- Blalock EM, Wasson RH. *Physician Leadership: Quality Improvement and Patient Care*. Philadelphia: Elsevier; 2014.
- Quakara A. Differentiating leader and leadership development: a collective framework for leadership development. *Journal of Agent Development*. 2010;2(5):432-441. doi:10.1108/02621711011030004
- Wardlaw DA, Jordan M, Vanden P. Charismatic leadership at the strategic level: A new application of upper echelons theory. *The Leadership Quarterly*. 2004;15(3):355-360. doi:10.1016/j.leaqua.2004.02.013
- Reinherz AL, and McLaughlin, G.B. Leadership and organizational context: the leader's' Leadership Quarterly. 2006;17(5):676.
- Berry A, Dublerstein, Walter T, Lee, Richard M, PhD. Overview of Professionalism Education: Bridging Barriers to the Medical Education Continuum. In: *High Stakes*. Charles Hobson, Roxanne Nelson, Adam Green, eds. Evaluating Challenges and Opportunities for Healthcare Reform (IG) Global; 2016. p. 205-221. doi:10.4137/9781782082620-010
- Fleury JP, Smith JF, Anwar S, Alkwasbi S, Brandy PW, Shum BS. Self-rater rating agreement in leadership: A review. *The Leadership Quarterly*. 2012;23(6):1005-1024. doi:10.1016/j.leaqua.2012.05.006
- McKinley DE, Hines JE, Hines JE. Improving Leadership Skills for Physicians: A Systematic Literature Review. *Leadership Studies*. 2016;24(4):19-31. doi:10.1002/lst.240
- Santer M, Harris A, Patten S, Schwan A. Evaluation of the University of Virginia Leadership in Academic Medicine Program. *Teaching and Learning in Medicine*. 2011;23(4):307-309. doi:10.1007/s12243-011-9117-7
- Wasson RH, Anderson RL. Assessment of Self-Other Ratings of Leader Effectiveness in an Academic Setting. *Journal of General Internal Medicine*. 2010;35(2):290-295. doi:10.1111/j.1365-2214.2009.02640.x
- Bent JF, Fried SP, Smith RV, Hsieh W, Choi K. Leadership Training in Otolaryngology Residency. *Otolaryngol Head Neck Surg*. 2011;156(6):1078-1079. doi:10.1177/0014584910388441
- Blalock EM, Wasson RH, Aguirre S, Schwan A. Evaluation of Leadership Training in Otolaryngology Residency. *Otolaryngol Head Neck Surg*. 2011;156(6):1078-1079. doi:10.1177/0014584910388441
- Johnson EM. Emotional intelligence as a crucial component to medical education. *Int J Med Educ*. 2015;16:179-183. doi:10.5116/ijme.5654.3044
- McKinley DE, Phusua ER, Felecciano VA, Dik C, et al. A multi-institutional study of the emotional intelligence of resident physicians. *The American Journal of Surgery*. 2010;200(1):26-33. doi:10.1016/j.amjsurg.2014.08.016
- Reinherz AL. Multigenerational workforce issues and their implications for leadership in nursing. *Workforce Issues and Implications for Leadership in Nursing*. *Journal of Nursing Management*. 2010;18(4):462-469. doi:10.1111/j.1365-2834.2010.01156.x
- Wasson RH. Mind the Gap: Generational Differences in Medicine. *Hospital Health Netw*. 2011;82(1):5.
- Reinherz AL. How to assess a multidimensional leadership capability. *Published online 2010*.
- Brink S, Frensch JW, MacLellan CD. Demographic and personality predictors of congruence in multi-source ratings. *Journal of Management Development*. 1996;15(5):47-55. doi:10.1108/JMD-07-1996-005
- Marshall DM, Brown R, Warren, David Nancy G. Leader self-awareness and its relationship to subordinate attitudes and performance. *Leadership & Organization Development Journal*. 2002;23(7):470-476. doi:10.1108/LOJ-07-2002-0066
- Owens D, Awanar LE. *Feeling and Understanding Self-Other Agreement: A LOOK AT RATER AND RATEE CHARACTERISTICS, CONTEXT, AND OUTCOMES*. *Personnel Psychology*. 2004;57(2):204-204. doi:10.1111/j.1468-7024.2004.02044.x
- Reinherz AL, Wasson RH. 360 DEGREE FEEDBACK AND LEADERSHIP DEVELOPMENT. 1998;9(4):4.
- Thiel Elizabeth C. The impact of associative coaching and 360 feedback on leadership effectiveness. *Leadership & Organization Development Journal*. 2002;23(4):205-214. doi:10.1108/LOJ-07-2002-0060
- Gregory PJ, Robbins B, Schwabartz SD, Hamon L. Leadership development in a professional medical society using 360-degree survey feedback to assess emotional intelligence. *Surg Endosc*. 2017;31(9):3565-3573. doi:10.1007/s00464-016-5386-8