

The Impact of Positive and Negative Intraoperative Surgeons' Leadership Behaviors on Surgical Team Performance

Julian Barling^a, PhD, Amy Akers^a, PhD, Darren Beiko^b, MD, MBA, FRCSC

^aSmith School of Business, Queen's University, Kingston, Ontario, Canada

^bDepartment of Urology, Queen's University, Kingston, Ontario, Canada

Julian Barling, PhD
Borden Professor of Leadership
Smith School of Business
Queen's University
Kingston, Ontario, Canada

Amy Akers, PhD
Smith School of Business
Queen's University
Kingston, Ontario, Canada

Darren Beiko, MD, MBA, FRCSC
Associate Professor
Department of Urology
Queen's University
Kingston General Hospital
76 Stuart Street
Kingston, Ontario, Canada
K7L 2V7
Tel: 001-613-548-2498
Fax: 613-545-1970
Email: beiko@queensu.ca

Corresponding author: Darren Beiko, MD, MBA, FRCSC

Meeting Presentation:

Northeastern Section of the American Urological Association, Buffalo, NY, Sept. 2016
World Congress on Endourology, Cape Town, South Africa, Nov. 2016

Brief title:

Impact of Surgeons' Leadership on Team Performance

BACKGROUND: The effects of surgeons' leadership on team performance are not well understood. The purpose of this study was to examine the simultaneous effects of transformational, passive, abusive supervision and over-controlling leadership behaviors by surgeons on surgical team performance.

METHODS: Trained observers attended 150 randomly selected operations at a tertiary care teaching hospital. Observers recorded instances of the four leadership behaviors enacted by the surgeon. Postoperatively, team members completed validated questionnaires rating team cohesion and collective efficacy. Multiple regression analyses were computed. Data were analyzed using the complex modeling function in MPlus.

RESULTS: Surgeons' abusive supervision was negatively associated with psychological safety (unstandardized $B = -.352$, $p < .01$). Both surgeons' abusive supervision (unstandardized $B = -.237$, $p < .01$), and over-controlling leadership (unstandardized $B = -.230$, $p < .05$) were negatively associated with collective efficacy.

CONCLUSIONS: This study is the first to assess the simultaneous effects of surgeons' positive and negative leadership behaviors on intraoperative team performance. Significant effects only surfaced for negative leadership behaviors; transformational leadership did not positively influence team performance.

Key Words: leadership, operating room, surgeon, team performance

Abbreviations

OR, operating room

INTRODUCTION

Leadership has been studied for decades, including in healthcare¹ and more recently surgeons' leadership. Henrickson et al. showed in observational studies of 23 and 29 operations that leadership behaviors occur during surgery;² they identified 258 leadership behaviors clustered around supportive behaviors, communication and task management³. Highlighting the role of leadership during surgery, these behaviors were more likely to occur during more complex operations.

Hu et al. were the first to study the effects of transformational, transactional and passive leadership on team behavior during surgery.⁴ They replicated findings from traditional organizations, showing that passive leadership exerted moderately negative effects, transformational leadership positively affected diverse aspects of surgical team behavior and performance, while transactional leadership was ineffective. We extend this and focus on transformational, passive and over-controlling leadership, and abusive supervision.

Abusive supervision, the most widely studied form of destructive leadership,⁵ is manifest in hostile verbal and nonverbal behaviors (e.g., rude, demeaning, demoralizing behaviors, excluding physical contact)⁶ that are sustained but intermittent. Over-control differs from abusive supervision; it is focused solely on performance mistakes or failures, would not be seen as personally directed, and occurs when leaders restrict followers' decision-making, requiring that they "follow orders". Like abusive supervision, over-controlling leadership exerts negative effects on subordinate creativity and performance, and psychological aggression by subordinates against their leaders.⁷ Over-controlling leadership behaviors are likely to occur during surgery, particularly after critical events during surgery when surgeons became more directive, and less developmental or supportive.²

Passive leadership (reflected in leaders' failing to reward or punish subordinates when warranted⁸) has attracted little research. Yet passive leadership predicts workplace accidents⁹ and bullying¹⁰ (the antithesis of psychological safety), poorer workplace attitudes¹¹ and team effectiveness.⁴ Passive leadership is also associated with less information sharing during surgery.⁴

High quality team performance during surgery is critical for achieving satisfactory outcomes; in one study, a lack of information sharing during the surgery and handoff phases predicted post-surgery complications or death after controlling statistically for ASA scores.¹² We focus on psychological safety and team efficacy, both of which are central to high quality team performance. Psychological safety reflects the belief among team members that it is safe to take risks, voice dissent and make errors¹³. One of the most consistent predictors of psychological safety is high quality leadership. In organizational research, transformational leadership predicts safety climate,¹⁴ team leader coaching predicts team members' psychological safety,¹⁵ and abusive supervision negatively predicts psychological safety.¹⁶ Within the surgical context, team safety climate predicted the successful implementation of new technology.¹⁷

Team or collective efficacy reflects the sense among team members that together they can successfully accomplish required tasks, which in turn predicts team effectiveness.¹⁸ Transformational leadership is an important predictor of collective efficacy,¹⁹ and we posit that the three forms of negative leadership will impede collective efficacy.

Last, research on leadership and psychological safety and team efficacy has invariably focused on one form of leadership alone. We investigate the simultaneous effects of transformational, passive and over-controlling leadership, and abusive supervision.

METHODS

Observers and training

Five observers (three final year nursing students and two 2nd year medical students) attended a full day training program. The focus in the morning was on leadership and included lectures and videos, and ended with the observers practicing ratings. Training in the afternoon was led by a practicing surgeon, and followed the training procedure used by Vashdi et al.²⁰

Data collection

Between June 15 and August 31, 2014, randomly selected operations from the Departments of Surgery, Obstetrics and Gynecology, and Urology were studied in a Canadian tertiary care teaching hospital. Ethics approval was obtained from the institutional Health Sciences Research Ethics Board. Prior to the study period, all potential operating room (OR) nurses, anesthesiologists, surgeons and affiliated residents were informed about the study and consent was obtained from those who opted to participate. Preoperatively, potential patients were approached and interested patients were consented. Pairs of trained observers attended 150 randomly selected operations at a tertiary care teaching hospital. Observers recorded instances of the four leadership behaviors enacted by the surgeon. Potential confounds representing specific contextual characteristics of an operation, such as patient age and gender, ASA rating and surgeon-rated complexity were controlled statistically before the effects of the different leadership behaviors were examined. Postoperatively, team members completed validated questionnaires rating team cohesion and collective efficacy.

Instruments

A summary of the leadership coding instruments, and the self-reported team performance scales, is shown in Table 1.

Statistical analyses

Prior to data collection, we calculated the necessary sample size to detect medium-level effect sizes at a power level of 0.9, given the number of predictors and the nature of the data.²¹ Results indicated that 116 observations would achieve this, and 150 were collected to further increase the power. Inter-rater reliability for the observers' ratings of the four leadership behaviors were calculated using weighted Cohen's Kappa; inter-rater agreement for the team members ratings of the two team performance variables were calculated with James, Demaree & Wolf's $r_{WG(J)}$.²² Because the intra-class correlation coefficients of the outcome variables deviated from zero (psychological safety = 0.63, team efficacy = 0.76), it was necessary to control for the nested nature of the data (i.e., the fact that data were derived from some surgeons who performed more than one surgery). This was accomplished using the "complex" function in the statistical program MPlus, and indicating the clustering variable at the surgeon level. The complex function uses a maximum likelihood algorithm to estimate coefficients, while controlling for the nested nature of the data. The coefficients and p-values may be interpreted as they would in a simple regression.

RESULTS

Ninety (60%) of the operations involved the Department of Surgery, 40 (27%) Obstetrics and Gynecology and 20 (13%) Urology. Within the Department of Surgery, specialties studied included general surgery, orthopedic surgery, vascular surgery, thoracic surgery, cardiac surgery, neurosurgery and plastic surgery. One hundred and twenty-six (84%) were elective operations

and 24 (16%) were emergency procedures. Mean patient age was 51 years, and 53% of patients were male. Demographic information for the participating surgeons, anesthesiologists, nurses and residents is displayed in Table 2, but were not included in the statistical model due to the statistical limitations of analyzing clustered data and because of the skewed nature of this information (e.g., 93% of the surgeons were male) and the statistical limitations of analysis of clustered data.

Descriptive data and individual-level correlations for the control variables, the four leadership variables and the two-team performance variables are shown in Table 3.

Multilevel regression analyses predicting psychological safety and collective efficacy are shown in Table 4. Surgeons' abusive supervision was negatively associated with psychological safety (unstandardized $\mathbf{B} = -.352$, $p < .01$). There were no significant associations between the other 3 leadership types and psychological safety ($p > .05$). Both surgeons' abusive supervision (unstandardized $\mathbf{B} = -.237$, $p < .01$), and over-controlling leadership (unstandardized $\mathbf{B} = -.230$, $p < .05$) were negatively associated with collective efficacy. Neither transformational leadership nor passive leadership were linked with collective efficacy.

DISCUSSION

Leadership in healthcare is becoming increasingly important, including the study of surgeons' leadership in the OR. While most research focuses on the effects of positive (e.g. transformational) leadership, the negative personal and organizational effects of passive leadership, abusive supervision and over-controlling leadership behaviors have also been identified as important, but had yet to be studied together in the unique and stressful OR environment. Acknowledging that neither organizational leaders nor surgeons display only one

style of leadership—as is evidenced in studies showing that seemingly conflicting styles of transformational and authoritarian leadership are not necessarily negatively related²³—this study examined the simultaneous effects of four different types of leadership. Both abusive supervision and over-controlling leadership predicted lower collective efficacy, while abusive supervision was also associated with lower levels of team members' psychological safety.

The findings from the present study achieve considerable importance for several reasons. First, the data were analyzed using multilevel modeling which controlled for the fact that the data are not independent as some surgeons were involved in more than one surgery, which could upwardly bias the magnitude of any findings. Second, we controlled for several variables (namely, patient age and gender, ASA score; see Table 4) that might provide potential rival explanations of any findings. Third, this is the first study to focus on a large number of operations among all surgical specialties (N = 150), thereby enhancing the generalizability of the current findings. Fourth, while some surgeons enact leadership during surgery,²⁴ people rated as high on transformational leadership are also rated highly on other positive leadership behaviors.²⁵ As a result, analyzing only one leadership style could produce overly optimistic estimates of the effects of transformational or passive leadership. In addition, even high quality leaders suffer lapses and engage in negative leadership, with meta-analyses indicating significant correlations (i.e., > .5) between transformational leadership and laissez-faire (or passive) leadership.^{26,27} In turn, “bad” leaders do not limit themselves to one type of destructive leader behavior,²⁸ highlighting the need to understand the simultaneous effects of different leadership behaviors. Simultaneously studying transformational, passive and over-controlling leadership, as well as abusive supervision, thus allows for a more nuanced evaluation of their effects during surgery.

Unlike previous findings, no support emerged for surgeons' transformational leadership, and several factors might account for this. First, a substantial finding from psychological research points to the power of negative over positive events in all aspects of people's lives.²⁹ More specifically to the current research, bad mentoring has greater negative effects on the quality of the relationship between mentor and protégé/mentee.³⁰ In the current study, any benefits to team performance that typically accrue from transformational leadership may have been suppressed in the presence of abusive supervision and/or over-controlling surgeon behaviors. Second, context may moderate which leadership behaviors are most effective: Authoritarian leadership was more effective than transformational leadership in situations in which resources were limited.²³

In addition, no effects emerged for passive leadership in the current study even though Flood et al. found simultaneous positive effects of CEO transformational leadership and negative effects for laissez-faire leadership in their study of top management team effectiveness. Similarly, while surgeons' passive leadership predicted negative team performance when examined in isolation,⁴ surgeons' passive leadership failed to predict either team cohesion or team efficacy in the current study. Again, its effects may be suppressed in the presence of more visible negative behaviors such as abusive supervision and over-controlling leadership.

These findings have several direct implications for our understanding of surgeons' leadership, and leadership theory more generally. First, any research on surgeons' leadership must go beyond the current practice in which single leadership behaviors are examined in isolation; instead, future research should focus on different leadership behaviors that are enacted simultaneously. Moreover, while the belief that people are either "good" leaders or not would suggest that focusing on multiple positive (or negative) leadership behaviors in isolation would

be sufficient, it is critical that any future research on surgeons' leadership integrate both positive and negative leadership.

Second, the findings of the current study have important practical implications for surgeons' leadership development, the need for which is emphasized by findings from the current study as well as other research: (a) Supportive and developmental leadership behaviors decrease in frequency after the "point of no return" during unanticipated surgical events,³ a time during which leadership arguably attains greater importance; (b) Surgical residents fared worse on the individualized consideration components of transformational leadership, the management-by-exception and laissez-faire components of transactional leadership than a U.S. normative sample;³¹ (c) Even when leadership behaviors are identified during surgery, they are often targeted at no specific team member in particular, potentially limiting their effects.³ Yet in the face of such findings, meta-analyses have shown that leadership training initiatives are effective, and cost effective as well, but are overwhelmingly focused on positive leadership behaviors.³² The current findings suggest strongly that the nature and effects of negative leadership behaviors need to be incorporated into leadership development initiatives; after all, even the best leaders lapse and enact negative leadership behaviors¹. Such lapses might become more likely in the presence of complications or unexpected events during surgery³, and leadership development initiatives that focus on positive and negative leadership behaviors, and include components of relapse prevention³³ are more likely to reap long-term benefits.

In the current study, we showed that surgeons' abusive supervision and over-controlling leadership predicted team performance. These findings suggest several avenues for future research. First, do similar effects emerge for others present during surgery, such as anesthesiologists, nurses or residents? Some research, for example, points to the role of

circulating nurses' leadership in establishing the nature of the initial work environment.³⁴ Second, consistent with some organizational research that focuses on shared leadership, future research could also focus on the shared or distributed rather than individual leadership during surgery, as recent research shows that some functions (e.g., patient safety) are more a function of leadership distributed across all team members rather than individual leadership.³⁵ Third, given that only abusive supervision and over-controlling leadership, but not passive leadership, exerted negative effects, future research should address which specific negative behaviors are sufficient to overwhelm the benefits of transformational leadership, and just how much negative leadership is sufficient to do so. Fourth, the simultaneous effects of different forms of leadership—regardless of the source—on patient outcomes such as unexpected blood transfusion during surgery or postoperative complications should be investigated. Fifth, with sufficiently large samples of surgeries, research should now focus on the effects of different leadership behaviors on clinical outcome measures such as complications during or following surgery.

Last, to be of any practical value, it is critical that leadership can be taught. While research has shown that this is possible in organizational contexts,³² future research should now implement and evaluate leadership development initiatives for all those involved in surgery with the same rigor typically given to clinical trials and clinical research in general.

CONCLUSIONS

This study is the first to assess the simultaneous effects of positive and negative leadership behaviors on intraoperative team performance, and extends research both on leadership in general and surgeons' leadership in particular. In our large sample size of 150 observed operations, we analyzed the effects of surgeons' use of 4 different leadership behaviors on the performance of the OR team. Interestingly, significant effects only surfaced for negative

leadership behaviors; transformational leadership behaviors did not positively influence team performance. This research highlights the need to go beyond an examination of single surgeons' leadership behaviors in isolation and stresses the importance of simultaneously studying different types of leadership behavior in the OR.

As a result of our findings, two implications emerge. First, the possibility that negative leadership behaviors are sufficient to suppress the effects of transformational leadership warrants further attention. Second, since surgeons enact more than one type of leadership, characterization of surgeons in terms of one leadership style (e.g., a “transformational” or “abusive” surgeon) is likely inaccurate. Therefore, educating surgeons about both positive and negative leadership behaviors offers the opportunity to enhance surgical team performance.

REFERENCES

- ¹ Barling, J. *The Science of Leadership: Lessons from Research for Organizational Leaders*. NY; Oxford University Press; 2014.
- ² Henrickson S, Yule S, Flin R, Yule S. A preliminary investigation of surgeon's leadership in the operating room. *Proceedings of the Human Factors and Ergonomics Society Annual Meeting*, 2010; 54: 867-871.
- ³ Parker S, Flin R, McKinley A. et al. Factors influencing surgeons' intraoperative leadership: Video analysis of unanticipated events in the operating room. *World J Surg* 2014; 35: 4-10.
- ⁴ Hu Y-Y, Parker S, Lipsitz S. et al. Surgeons' leadership styles and team behavior in the operating room. *J Am Coll Surg* 2016; 222:41-51.
- ⁵ Martinko M. Harvey P. Brees, J. et al. A review of abusive supervision research. *Journal of Organizational Behavior*, 2013; 34: 120-137.
- ⁶ Tepper, B. Consequences of abusive supervision. *Academy of Management J.*, 2000; 43: 178-190.
- ⁷ Oldham G, Cummings A. Employee creativity: Personal and contextual factors at work. *Academy of Management Journal* 1996; 39: 607-634.
- ⁸ Hinkin, T. R., & Schriesheim, C. A. An examination of "nonleadership": From laissez faire leadership to leader reward omission and punishment omission. *J Applied Psychology* 2008; 93: 1234-1248.
- ⁹ Kelloway EK, Mullen J, Francis L. Divergent effects of transformational and passive leadership on employee safety. *J Occup Health Psychology* 2006; 11: 76 - 86.
- ¹⁰ Skogstad A, Einarsen S, Torsheim, T, et al. The destructiveness of laissez-faire leadership behavior. *Journal of Occupational Health Psychology* 2007; 12: 80-92.
- ¹¹ Judge T, & Piccolo R. Transformational and transactional leadership: A meta-analytic test of their relative validity. *Journal of Applied Psychology* 2004; 89: 755-768
- ¹² Mazzacco K, Petitti D, Fong K. et al. Surgical team behaviors and patient outcomes. *American Journal of Surgery*, 2009; 197: 678-685.
- ¹³ Edmondson A. Psychological safety and learning behavior in work teams. *Administrative Science Quarterly*, 1999; 44: 350-383
- ¹⁴ Zohar D. The effects of leadership dimensions, safety climate, and assigned work priorities on minor injuries in work groups. *Journal of Organizational Behavior*, 2002; 23: 75-92.
- ¹⁵ Schaubroeck J. Lam S. Cha S. Embracing transformational leadership: Team values and the impact of leader behavior on team performance. *Journal of Applied Psychology*, 2007; 92: 1020-1030.
- ¹⁶ Liu W, Zhang P, Liao J. et al. Abusive supervision and employee creativity: The mediating role of psychological safety and organizational identification. *Management Decision* 2016; 54: 130-147.
- ¹⁷ Edmondson A. Speaking up in the operating room: How team leaders promote learning in interdisciplinary action teams. *Journal of Management Studies* 2003; 40: 1419-1452.
- ¹⁸ Mathieu J, Rapp T, Maynard M. et al. Interactive effects of team and task shared mental models as related to air traffic controllers' collective efficacy and effectiveness. *Human Performance* 2010; 23: 22-40.
- ¹⁹ Walumbwa F, Wang P, Lawler J. et al. The role of collective efficacy in the relations between transformational leadership and work outcomes. *Journal of Occupational and Organizational Psychology*, 2004; 77: 515-530.

- ²⁰ Vashdi D, Bamberger, P, Erez, M. Can surgical teams ever learn? The role of coordination, complexity and transitivity in action team learning. *Academy of Management J* 2013; 56: 945-971.
- ²¹ Cohen, J. (1988). *Statistical Power Analysis for the Behavioral Sciences* (2nd Edition). Hillsdale, NJ: Lawrence Earlbaum Associates.
- ²² James L. Demare R. Wolf G. rWG: An assessment of within-group interrater agreement. *Journal of Applied Psychology*, 1983; 78: 306-309.
- ²³ Huang, X., Xu, E., Chiu, W., Lam, C. & Farh, J-L. (2015). When authoritarian leaders outperform transformational leaders: Firm performance in a harsh economic environment. *Academy of Management Discoveries*, Vol 1, 180-200.
- ²⁴ Parker S, Yule S, Flin R. et al. Surgeon's leadership in the operating room: An observational study. *American Journal of Surgery* 2012; 204: 347-354.
- ²⁵ Che, Z, Zhu J, Zhou M. How does a servant leader fuel the service fire? A multilevel model of servant leadership, individual self identity, group competition climate, and customer service performance. *J Applied Psychology* 2015; 100:511 – 521.
- ²⁶ Rowold J, Borgman L, Diebig M. A “tower of babel”? – interrelations and structure of leadership constructs. *Leadership & Organization Development J* 2015; 36:137 – 160.
- ²⁷ Flood P, Hanna E, Smith K et al. Chief executive leadership style, consensus decision making, and top management team effectiveness. *European Journal of Work and Organizational Psychology* 2000; 9: 401-420.
- ²⁸ Shaw JG, Erickson A, Harvey M. A method for measuring destructive leadership and identifying types of destructive leaders in organizations. *Leadership Quarterly* 2011; 22:575 - 590
- ²⁹ Baumeister R, Bratslavsky E, Finkenauer C et al. Bad is stronger than good. *Review of General Psychology* 2001, 5: 323-370.
- ³⁰ Eby L, Butts M, Durley J. et al. Are bad experiences stronger than good ones in mentoring relationships? Evidence from the protégé and mentor perspective. *Journal of Vocational Behavior* 77; 2010: 81-92.
- ³¹ Horwitz I, Horwitz S, Daram P. et al. Transformational, transactional and passive-avoidant leadership characteristics of a surgical resident cohort: Analysis using the Multifactor Leadership Questionnaire and implications for improving surgical education curriculums. *Journal of Surgical Research* 2008; 148: 49-59.
- ³² Avolio B, Reichard E, Hannah S, et al. A meta-analytic review of leadership impact research: Experimental and quasi-experimental studies. *Leadership Quarterly* 2009; 20: 764-784
- ³³ Witkiewitz, K. Marlatt, G. Relapse prevention for alcohol and drug problems: That was Zen, this is Tao. *American Psychologist*, 2004; 59: 224-235.
- ³⁴ Leach L, Myrtle R, Weaver F. Surgical teams: role perspectives and role dynamics in the operating room. *Heath Services Management Research*, 2011; 24: 81-90.
- ³⁵ Rydenfält C, Johansson G, Odenrich P et al. Distributed leadership in the operating room: A naturalistic observation study. *Cognition, Technology and Work* 2015; 17: 451-460.
- ³⁶ Beauchamp MR, Barling J, Li Z, Morton KL, Keith SE, & Zumbo BD Development and psychometric properties of the Transformational Teaching Questionnaire. *J Health Psychology* 2010; 15: 1123-1134.
- ³⁷ Mitchell M, Amrose M. Abusive supervision and workplace deviance and the moderating effects of negative reciprocity beliefs. *J Applied Psychology* 2007; 92: 1159-1168.

³⁸ Dupré, K., & Barling, J. (2006). Predicting and preventing supervisory workplace aggression. *Journal of Occupational Health Psychology*, 11, 13-26.

³⁹ Chen G, Gully S, Eden D. Validation of a new general self-efficacy scale. *Organizational Res Methods* 2001; 4: 62-83.

Table 1. Summary of the leadership coding instruments and team performance scales.

	Source of rating	Behavior/item examples	Reliability
Transformational leadership ³⁶	2 trained observers	Leader is enthusiastic about what he/she is capable of achieving	0.67
Passive leadership ⁸	2 trained observers	He/she often performs well and still receives no praise from the leader	0.89
Abusive supervision ³⁷	2 trained observers	Leader puts him/her down in front of others	0.96
Over-controlling leadership ³⁸	2 trained observers	My leader closely monitors my performance for errors	0.73
Psychological safety ²	Team members	Members of this team are able to bring up problems and tough issues	0.74
Collective efficacy ³⁹	Team members	This team will be able to successfully overcome many challenges	0.92

Table 2. Demographic characteristics of surgeons, anesthesiologists, nurses and residents

Team Member	N	Male Gender	Age (yrs)	Hospital tenure (yrs)	Professional tenure (yrs)^a
			M/SD	M/SD	M/SD
Surgeons	42	93%	50.4/9.4	13.4/10.1	23.1/9.7
Anesthesiologists	32	66%	44.4/6.8	11.5/6.7	18.7/6.4
Nurses	39	5%	43.0/9.6	12.3/7.1	14.8/7.8
Residents	39	54%	30.2/3.3	2.7/1.4	2.9/1.5

^a Not including medical school or university training

Table 3. Descriptive statistics and individual-level inter-correlations for control, leadership and team performance variables¹

	Mean (SD)	1	2	3	4	5
1. Transformational Leadership.	2.35 (1.72)					
2. Abusive supervision	0.04 (0.24)	-0.03				
3. Overcontrol	0.14 (0.37)	-0.03	0.08			
4. Laissez-faire	0.08 (0.33)	-0.10	0.07	0.02		
5. Psychological safety	5.65 (0.53)	-0.02	-0.16	-.25**	-0.06	
6. Team efficacy	4.4 (0.32)	0.06	-.17*	-.27**	0.00	0.51**

¹ Notes:

1. The correlations in the table do not take the nested nature of the data into account, and should only be considered as a guide to understanding the directional relationships of data

2. Significant correlations are bolded

* $p < 0.05$ ** $p < 0.001$

YOB, year of birth; ASA, American Society of Anesthesiologists; TFL, transformational; AS, abusive supervision; OC, over-controlling; LF, laissez-faire

Table 4. Multilevel regression analyses predicting psychological safety and collective efficacy

	Psychological Safety		Collective Efficacy	
	Beta¹ (S.E.)	p value	Beta (S.E.)	p value
Constant	0.05 (0.07)	0.46	0.03 (0.06)	0.60
Patient Sex	-0.04 (0.11)	0.71	-0.02 (0.07)	0.77
Patient Year of birth	0.00 (0.00)	0.18	-0.01 (0.00)	<0.02
Anesthesia-Spinal	0.26 (0.15)	0.09	0.10 (0.09)	0.24
Anesthesia-Local	-0.17 (0.15)	0.28	-0.09 (0.08)	0.31
Anesthesia-Combination	-0.08 (0.18)	0.66	-0.12 (0.12)	0.30
ASA Rating	-0.08 (0.06)	0.15	-0.02 (0.03)	0.45
Emergency	-0.25 (0.14)	0.07	-0.10 (0.09)	0.26
Complexity	0.01 (0.03)	0.74	0.01 (0.01)	0.69
Transformational leadership	-0.02 (0.02)	0.46	0.01 (0.02)	0.58
Abusive supervision	-0.35 (0.08)	<0.01	-0.24 (0.09)	<0.01
Laissez-faire leadership	-0.04 (0.08)	0.67	0.05 (0.06)	0.45
Over-controlling leadership	-0.34 (0.18)	0.06	-0.23 (0.09)	<0.01

¹Unstandardized beta
