Received 30 June 2017
Revised 10 August 2017
1 November 2017
Accepted 2 November 2017

A long-term follow-up of a physician leadership program

Magali Fassiotto
Office of Faculty Development and Diversity, Stanford University School of Medicine, Stanford, California, USA
Yvonne Maldonado
Department of Pediatrics, Stanford University School of Medicine, Stanford, California, USA, and
Joseph Hopkins
Department of Medicine, Stanford University School of Medicine, Stanford, California, USA

Abstract

Purpose – Physician leadership programs serve to develop individual capabilities and to affect organizational outcomes. Evaluations of such programs often focus solely on short-term increases in individual capabilities. The purpose of this paper is to assess long-term individual and organizational outcomes of the Stanford Leadership Development Program.

Design/methodology/approach – There are three data sources for this mixed-methods study: a follow-up survey in 2013-2014 of program participants ($n = 131$) and matched (control) non-participants ($n = 82$) from the 2006 to 2011 program years; promotion and retention data; and qualitative in-person interview data. The authors analyzed survey data across leadership knowledge, skills, and attitudes as well as leadership titles held, following program participation using Pearson's χ^2 test of independence. Using logistic regression, the authors analyzed promotion and retention among participants and non-participants. Finally, the authors applied both a grounded theory approach and qualitative content analysis to analyze interview data.

Findings – Program participants rated higher than non-participants across 25 of 30 items measuring leadership knowledge, skills, and attitudes, and were more likely to hold regional/national leadership titles and to have gained in leadership since program participation. Asian program participants were significantly more likely than Asian non-participants to have been promoted, and women participants were less likely to have left the institution than non-participants. Finally, qualitative interviews revealed the long-term impact of leadership learning and networking, as well as the enduring, sustained impact on the organization of projects undertaken during the program.

Originality/value – This study is unique in its long-term and comprehensive mixed-methods nature of evaluation to assess individual and organizational impact of a physician leadership program.

Keywords Evaluation, Leadership, Continuing professional development

Paper type Research paper

Introduction

Physician leaders are required to meet the challenges facing today's clinical, research, and education enterprises in healthcare, and particularly in academic medical centers (AMCs) (Ham, 2003; Stoller, 2009). In response, AMCs have created faculty leadership and career development programs (AAMC, 2010), and the Association of American Medical Colleges (AAMC, 2013; AAMC, 2016) offers leadership resources, programs, and publications with key strategies for implementing reform.

Journal of Health Organization and Management
Vol. 32 No. 1, 2018
pp. 56-68

1477-7266
DOI 10.1108/JHOM-08-2017-0208

The authors would like to thank the leadership of the Stanford School of Medicine and Stanford Health Care as well as the study participants. This work was supported by the Stanford School of Medicine and Stanford Health Care. Dr Fassiotto presented initial findings at the Association of American Medical Colleges Group on Faculty Affairs Professional Development Conference, July 19, 2014, Boston, MA.

The goals of leadership development programs are twofold: to strengthen individual participants' skills and to consequently provide impact on organization-wide goals (Frich *et al.*, 2015). Leadership development thus requires a multi-pronged approach, with formal organized training providing a structured format beyond merely the "learning on the job" method of the past (Ham *et al.*, 2011). Leadership in an educational environment both converges and diverges from general leadership principles (Goldring *et al.*, 2015). Among physician faculty in particular, leadership training must span the tripartite organizational objectives of research, education, and patient care in order to provide meaningful individual skillsets and lasting organizational impact (Lobas, 2006; Hickson *et al.*, 2007; Steinhilber and Estrada, 2015). These include, among others, a focus on: personal leadership style; managing people, projects, and finances; and understanding the organizational system, inclusive of both the school and hospital (Hopkins *et al.*, 2017).

Evaluations of physician leadership programs have proliferated in recent years; however, there are relatively few assessments of long-term effectiveness of such programs, and nearly all evaluations focus exclusively on individual changes, without assessing organizational impact (Dannels *et al.*, 2008; Day *et al.*, 2010; Frich *et al.*, 2015; Straus *et al.*, 2013). In addition, few programs include action learning projects, despite their proven effectiveness (Marquardt *et al.*, 2009). Even less common are qualitative evaluations. Authors of a review of ten programs in AMCs commented: "Because developing leadership attitudes and skills is a personal journey for individuals, qualitative studies may be particularly useful in understanding the physicians' career aspirations and goals over the course of the training" (Straus *et al.*, 2013).

The purpose of this study was to undertake a long-term, mixed-methods evaluation of an academic physician leadership program to understand impacts on both individual participants and on the organization.

Methods

Program background

The Stanford Leadership Development Program (SLDP) consisted of six one-and-one-half day sessions over nine months focusing on basic leadership skills for Stanford Medicine faculty. Program expenses were jointly covered by the School of Medicine and Hospitals and both School and Hospital leadership nominated individuals for the program based on their potential for leadership. The curriculum was comprised of competencies recommended for healthcare leaders (Taylor *et al.*, 2008; National Center for Healthcare Leadership, 2005) including personal development as a leader, managing people and relationships, managing groups and projects, managerial finance and accounting, and understanding the organizational system (Hopkins *et al.*, 2017). Sessions were taught using interactive teaching methods based on adult learning principles (Russell, 2006). During the program, participants led interdisciplinary teams to complete action learning projects related to their leadership role. A detailed report of the nomination process, curriculum, and short-term program evaluation using Kirkpatrick's four levels of evaluation has been previously published (Hopkins *et al.*, 2017; Kirkpatrick and Kirkpatrick, 2006).

Materials

Long-term assessment consisted of: a follow-up leadership survey among past program participants compared to a matched group of non-participants; analysis of promotion and retention of program participants and non-participants; and in-person interviews with a random sample of past program participants. The study was deemed exempt from Stanford's Institutional Review Board. The data sets analyzed during the current study are available from the corresponding author on reasonable request.

Participant vs non-participant groups

To understand how SLDP participation might differentially affect leadership outcomes, we analyzed results across a total of 213 individuals. Our treatment group consisted of all SLDP faculty participants from 2006 to 2011 ($n = 131$, excluding one deceased). Our comparison group consisted of those nominated for the 2006-2011 programs but who could not participate due to prior commitments or because of a particularly competitive selection process in that cohort ($n = 82$, excluding one deceased).

Leadership survey

In 2013-2014, participant and non-participant groups were e-mailed a request to complete an electronic survey on leadership based on their prior SLDP nomination. The survey, a version of the program's short-term evaluation instrument, was designed to measure self-assessed leadership knowledge, skills, and attitudes. There were 82 respondents from the SLDP participant group (response rate = 63 percent) and 21 from the non-participant comparison group (response rate = 26 percent). While response rates were significantly lower among non-participants, this may lead to conservative estimates of differences as, presumably, those most invested in their leadership skills were likelier to respond. The survey was sent in two waves: first to 2006-2008 nominees and second to 2009-2011 nominees. One question from the second wave, regarding current leadership roles, was not asked in the first wave. Finally, in a section designed solely for past SLDP participants, respondents were asked about the most valuable skills learned during SLDP and skills they felt they had not learned enough about.

Promotion and retention

We next examined promotion and retention of SLDP participant and non-participant groups from year of nomination (2006-2011) as of September 2015 using data on all 213 faculty participants and non-participants. We analyzed differences between both groups by participation year, faculty line, gender, race/ethnicity, and rank at nomination.

Statistical analysis

Statistical analyses were conducted using Stata13 (StataCorp, 2013). For leadership survey analyses, we conducted Pearson's χ^2 test of independence, which does not require that the two samples (participant and non-participant groups) be the same size. For promotion and retention analyses, we used both Pearson's test to understand bivariate relationships and logistic regression to control for key demographic characteristics simultaneously.

Interviews

The third assessment component involved interviews with a randomly selected subset of past SLDP participants. Using a random number generator, all 2006-2011 participants who were still at Stanford were assigned a number, sorted by the number, and stratified by action learning project type: business, new program-clinical, new program-education, new program-research, patient experience, and quality/process improvement. Quality/process improvement projects were the largest group (48 percent). Each remaining project type was chosen by between 5 and 15 percent of participants in any given year. In order to ensure representativeness of project types, we used non-probability quota sampling to target three interviewees from each of the first five project categories and six from the quality/process improvement category. In total, 21 potential interviewees were contacted; one identified interviewee who led an action learning project focused on business needs within the hospital did not respond for a total of 20 completed interviews.

We conducted structured interviews to understand the current state of projects completed during the course, sustained impact of projects, and to capture lasting impressions of program learning (see Appendix 1) Interviews were analyzed using both a grounded theory approach (Strauss and Corbin, 2008) to understand the complexity of related factors involved in evaluating SLDP project and coursework effectiveness, as well as qualitative content analysis to identify recurring themes and patterns. Responses were in free-text form and manually coded using open coding.

Results

Participants

Demographic analysis revealed no significant differences between SLDP participants and non-participants (Table I). Overall, 68 (32 percent) were female, 136 (64 percent) were White, 49 (23 percent) were Asian, 20 (9 percent) were underrepresented minorities (URM), and 8 (4 percent) had unreported ethnicities. While there were more unreported race/ethnicities among non-participants ($p = 0.03$), at such low numbers, this should not adversely affect analyses. Across rank at nomination, 63 (30 percent) were assistant professors, 101 (47 percent) associate professors, and 49 (23 percent) full professors.

Stanford Medicine has four faculty lines: the medical center line, MCL, focused on clinical care and research; the university tenure line, UTL, focused on research; the clinician-educator

	n (%)			
	Total ($n = 213$)	SLDP ($n = 131$)	Non-SLDP ($n = 82$)	*p*-value[a]
Gender				
Male	145 (68%)	84 (64%)	61 (74%)	0.12
Female	68 (32%)	47 (36%)	21 (26%)	0.12
Race/ethnicity				
White	136 (64%)	83 (63%)	53 (65%)	0.85
Asian	49 (23%)	33 (25%)	16 (20%)	0.34
Underrepresented minority	20 (9%)	13 (10%)	7 (9%)	0.74
Declined to state/unreported	8 (4%)	2 (2%)	6 (7%)	0.03
Position at participation				
Assistant professor	63 (30%)	40 (31%)	23 (28%)	0.70
Associate professor	101 (47%)	65 (50%)	36 (44%)	0.42
Professor	49 (23%)	26 (20%)	23 (28%)	0.17
Line				
MCL	132 (62%)	84 (64%)	48 (59%)	0.41
CE	37 (17%)	24 (18%)	13 (16%)	0.64
UTL	37 (17%)	20 (15%)	17 (21%)	0.31
NTL	7 (3%)	3 (2%)	4 (5%)	0.30
Participation year				
2006	31 (15%)	23 (18%)	8 (10%)	0.12
2007	31 (15%)	23 (18%)	8 (10%)	0.12
2008	20 (9%)	11 (8%)	9 (11%)	0.53
2009	44 (21%)	22 (17%)	22 (27%)	0.08
2010	42 (20%)	26 (20%)	16 (20%)	0.95
2011	45 (21%)	26 (20%)	19 (23%)	0.56

Notes: [a]*p*-values from the Pearson's χ^2 test of independence. Because the χ^2 test of independence is non-parametric, it is not affected by the unequal sample sizes in this data; Analysis excludes two members (one member of the non-participant group and one member of the participant group) who are deceased. Findings do not change substantively with these members' inclusion

Table I.
Demographic analysis of SLDP nominees, including past participants and non-participants from 2006 to 2011

line, CE, focused on clinical care and teaching; and the non-tenure line, NTL, focused on research or teaching. Between 2006 and 2011, most faculty members within the school were MCL, which is reflected in our sample ($n = 132$, 62 percent). Finally, participants and non-participants were similarly spread across nomination year with the exception of 2008, in which a smaller cohort was sought.

Of the 20 SLDP participants randomly selected for in-person interviews, 8 (40 percent) were female, 14 (70 percent) were White, 4 (20 percent) were Asian, and 2 (10 percent) were URM. Across rank and line: 6 (30 percent) were assistant professors at participation, 9 (45 percent) associate professors; 5 (25 percent) full professors; and 10 (50 percent) were MCL. All demographics are comparable to the larger sample.

Leadership knowledge, skills, attitudes, and roles since nomination

Respondents were first surveyed about current leadership knowledge, skills, and attitudes (Table II). SLDP participants rated themselves higher than non-participants across all six knowledge items. Across five of the six items, ratings were significantly higher ($p < 0.05$) for participants.

SLDP participants rated themselves higher than non-participants on 8 of 14 skills items. Of these items, participants rated their skills significantly higher than non-participants in ability to create and articulate a vision ($p = 0.02$) and ability to carry out performance evaluations and provide constructive feedback ($p = 0.01$). All respondents rated themselves particularly high on skills items (9 of 14 items received ratings over 70 percent), which could partially explain the lack of further differences.

Participants rated themselves higher than non-participants across all ten items on leadership attitudes. Across three of the ten items, focused on perceptions of support from the School and colleagues, ratings were significantly higher ($p < 0.05$) for participants.

Respondents from 2009 to 2011 cohorts were also asked about current leadership roles (Table III). A higher percentage of participants reported current roles across all leadership levels, although differences were not significant across School leadership positions. Participants were, however, significantly more likely to hold regional or national leadership titles ($p = 0.02$) and to have taken on new leadership titles since SLDP nomination ($p < 0.01$).

Valued leadership skills

In a survey section reserved for SLDP participants, respondents listed skills learned during SLDP perceived as most valuable, and skills participants now wished they had learned more about. The five most valuable skills learned were: team building/management; communication/difficult conversations; project development/implementation; networking; and negotiation. The five most frequently cited skills participants felt they had not learned enough about were: finance; navigating a complex organizational system; conflict resolution; team building/management; and time/stress management. Of note, one skill, team building/management, was mentioned under both areas likely indicating its importance to the academic medical workplace. While 31 of 80 respondents (39 percent) felt it had been among the most valuable skills learned, 13 of 75 respondents (17 percent) also wished they had learned more about it.

Promotion and retention since nomination

We next examined promotion among participants and non-participants as of September 2015. Excluding full professors at nomination and those who had since left Stanford, 67 (79 percent) of 85 program participants and 36 (78 percent) of 46 non-participants received promotions since nomination ($p > 0.94$), indicating no significant difference.

	n (%) ratings 4-5			Valid *n*		
	Total	SLDP	Non-SLDP	SLDP	Non-SLDP	*p*-value[a]
Knowledge: understanding of organizational system						
Leadership structure	69 (68%)	60 (74%)	9 (45%)	81	20	0.01
Challenges currently facing academic medicine in the USA	68 (67%)	59 (73%)	9 (43%)	81	21	0.01
Avoid legal pitfalls in human resources	51 (50%)	45 (56%)	6 (30%)	81	20	0.04
Reward systems	45 (45%)	40 (49%)	5 (25%)	81	20	0.05
Financial management	41 (41%)	34 (42%)	7 (35%)	81	20	0.57
Basic concepts in managerial accounting and finance	39 (38%)	37 (46%)	2 (10%)	81	21	< 0.01
Skills: leadership ability						
Communicate effectively when making presentations to groups	84 (82%)	67 (82%)	17 (81%)	82	21	0.94
Create and articulate a vision	83 (81%)	70 (85%)	13 (62%)	82	21	0.02
Coach and give guidance	83 (81%)	66 (80%)	17 (81%)	82	21	0.96
Recognize unconscious bias, use a range of skills in working with individuals of different gender, ethnicity, professional roles, and work styles	78 (76%)	62 (76%)	16 (76%)	82	21	0.96
Inspire others to act in accordance with a vision	78 (72%)	61 (74%)	13 (62%)	82	21	0.26
Use resources to effect change	70 (68%)	59 (72%)	11 (52%)	82	21	0.09
Carry out performance evaluations and provide constructive feedback	69 (67%)	60 (73%)	9 (43%)	82	21	0.01
Deal with difficult interpersonal issues	63 (59%)	48 (58%)	15 (71%)	82	21	0.28
Resolve conflicts	60 (59%)	44 (54%)	16 (76%)	81	21	0.07
Negotiate effectively	54 (52%)	43 (52%)	11 (52%)	82	21	1.00
Skills: team management ability						
Lead effective meetings	91 (88%)	74 (90%)	17 (81%)	82	21	0.24
Lead and support teams in achieving objectives	90 (87%)	72 (88%)	18 (86%)	82	21	0.80
Evaluate the effectiveness of projects that you lead	80 (78%)	63 (76%)	17 (81%)	82	21	0.69
Structure decision making in groups	75 (73%)	60 (73%)	15 (71%)	82	21	0.87
Attitudes: team practices						
Work toward a solution rather than just identifying a problem	89 (87%)	71 (88%)	18 (86%)	81	21	0.81
When you are a member of a team, participate fully	88 (87%)	73 (90%)	15 (75%)	81	20	0.07
Pull a team together, take charge, and initiate action when you see a problem	83 (81%)	67 (83%)	16 (76%)	81	21	0.49
Take responsibility for getting the most out team members	74 (73%)	61 (75%)	13 (62%)	81	21	0.22
Attitudes: perceptions of institutional support						
Stanford University is a place where careers can develop	68 (67%)	57 (70%)	11 (52%)	81	21	0.12
Feeling connected to and supported by your colleagues at work	63 (62%)	55 (66%)	8 (38%)	80	21	0.02
Feeling connected and supported in your relationships with colleagues	59 (58%)	49 (60%)	10 (48%)	81	21	0.29
Anyone is watching your progress/performance	54 (53%)	47 (58%)	7 (33%)	81	21	0.04
The School of Medicine cares about you	41 (40%)	37 (46%)	4 (19%)	81	21	0.03
Stanford Hospital & Clinics cares about you	28 (27%)	24 (30%)	4 (19%)	81	21	0.33

Notes: [a]*p*-values from the Pearson's χ^2 test of independence. Because the χ^2 test of independence is non-parametric, it is not affected by the unequal sample sizes in this data

Table II. Self-ratings of leadership knowledge, skills, and attitudes among 2006-2011 SLDP and non-SLDP respondents in a long-term follow-up survey

However, given research supporting the importance of institutional programs for diverse individuals, we further investigated whether certain demographic groups were disproportionately affected by program participation. While there was no difference in the effect of SLDP participation on promotion by gender (all $p > 0.85$), we did find a significant

effect by race/ethnicity. Using logistic regression to predict promotion controlling for rank at nomination, nomination year, and faculty line, the interaction between Asian race and SLDP participation was positive and significant ($\beta_{Asian \times SLDP\_Participant} = 2.35, p = 0.047$). Main effects were not significant ($\beta_{Asian} = -1.01,\ p > 0.25$; $\beta_{SLDP\_Participant} = -0.58,\ p > 0.32$). Analyses revealed no significant differences by URM status, although this group is quite small.

Figure 1 presents results graphically. Based on the regression model, an Asian MCL assistant professor participating in SLDP in 2010 had a 93 percent probability of promotion

Table III.
Self-reported levels of leadership and leadership titles among 2009-2011 SLDP participants and non-SLDP respondents in a long-term follow-up survey

		n (%)[a]	*p*-value[b]
Respondents reporting working at some level of leadership at Stanford	SLDP	44 (98%)	0.19
	Non-SLDP	19 (90%)	
Respondents with a leadership title at Stanford specific to administration	SLDP	39 (87%)	0.29
	Non-SLDP	16 (76%)	
Respondents with a leadership title at Stanford specific to research	SLDP	31 (69%)	0.58
	Non-SLDP	13 (62%)	
Respondents with a regional or national leadership title	SLDP	24 (53%)	0.02
	Non-SLDP	5 (24%)	
Respondents with a new leadership title since SLDP nomination	SLDP	30 (67%)	< 0.01
	Non-SLDP	3 (14%)	

Notes: [a]Valid *n* for all questions in this table is the total number of respondents in the sample: 45 for SLDP participants and 21 for non-SLDP participants. Note that only SLDP participants who took the course in 2009-2011 were asked this survey question; [b]*p*-values from the Pearson's χ^2 test of independence

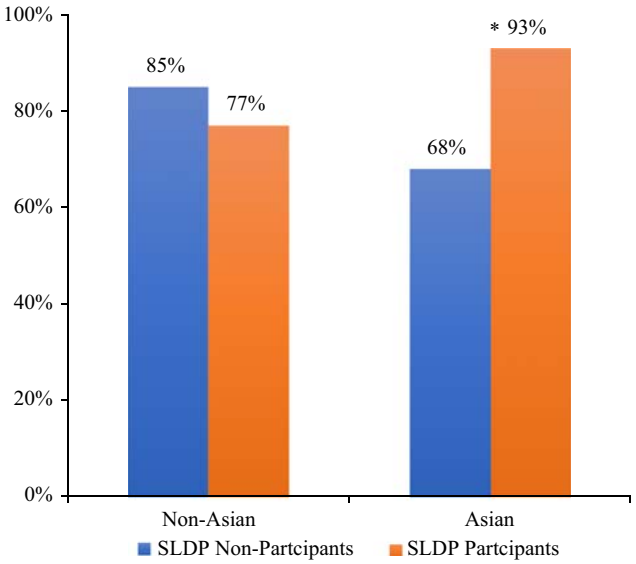


Figure 1.
Promotion as of 2015 among 2006-2011 SLDP participants and non-SLDP respondents in a long-term follow-up analysis: Asian vs non-Asian

Notes: n=131. Probability of promotion based on logistic regression controlling for nominees' rank at nomination, nomination year, and faculty line. Excludes those who were full professors at the time of nomination and those who had since left Stanford. Probability calculations hold the following variables constant: assistant professor=1, nomination year=2010, faculty line=MCL. *p<0.05

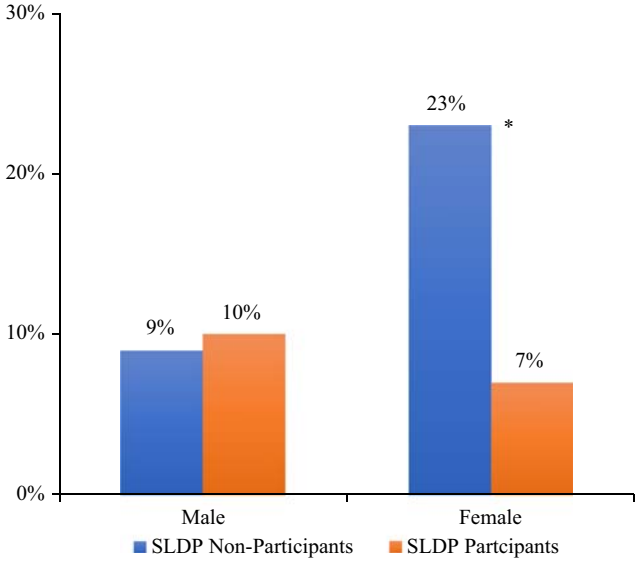
as of September 2015. The probability of a corresponding faculty member's promotion without program participation falls to 68 percent.

We also sought to analyze whether program participation impacted retention. Overall, 24 (18 percent) of 131 SLDP participants departed Stanford since their nomination, compared with 16 (20 percent) of 82 non-participants ($p > 0.72$). When additional analyses were conducted to understand any disproportionate effects for diverse groups, race/ethnicity had no significant impact on the effect of program participation on retention (all $p > 0.14$). However, women faculty did appear more likely to remain at Stanford following SLDP participation.

Using logistic regression to predict departure controlling for rank at nomination, nomination year, and faculty line, women non-participants had significantly higher odds of leaving ($\beta_{Female} = 1.17$, $p = 0.042$). The interaction between gender and participation in SLDP was negative and significant ($\beta_{Female*SLDP\_Participant} = -1.52$, $p = 0.049$), indicating a large gap between women participants and non-participants. There was no main effect for SLDP participation ($\beta_{SLDP\_Participant} = 0.19$, $p > 0.71$). Figure 2 represents the probability of departure by gender controlling for other demographic characteristics. A women MCL assistant professor nominated but not participating in the 2010 program had a 23 percent probability of departure by September 2015. In contrast, if that same women faculty had participated in SLDP, her predicted probability of departure falls to 7 percent.

Qualitative analysis: interviews

Lastly, we analyzed qualitative data from structured interviews with a randomly selected group of 20 SLDP participants. Recurrent interview themes included: the overall program value for current leadership roles; the importance of action learning projects; the continued impact of projects; and the additional benefit of networking.



Notes: $n = 213$. Probability of departure from Stanford School of Medicine based on logistic regression controlling for nominees' rank at nomination, nomination year, and faculty line. Probability models hold the following variables constant: assistant professor = 1, nomination year = 2010, faculty line = MCL. *$p < 0.05$

Figure 2.
Retention as of 2015 among 2006-2011 SLDP participants and non-SLDP respondents in a long-term follow-up analysis: female vs male

Throughout the interviews, participants reflected on their overall program experiences. SLDP offered participants an opportunity to learn about and work on their strengths and weaknesses, preparing them for current leadership roles:

> I thought it was an incredible gift. It gave me basic tools I didn't have before to be a leader within every team I work on. It helped me to understand myself better too (Female, Assistant Professor at time of SLDP participation).

> The skills I learned were immediately transferrable to my leadership position. The program prepared me very well for my current role as department chair (Female, Associate Professor).

> It was an outstanding course. Well-designed. The speakers were superb. From the whole United States – not just Stanford. It gave me the 35,000-feet perspective for how organizations work, what leadership is about, how leadership works. These are the things never taught in Medical School, residency, or fellowship. It was among one of the most beneficial things I received at Stanford as faculty (Male, Associate Professor).

Participants were also asked which of the school's tripartite mission areas their projects impacted. A total of 18 of the 20 projects had impacts on patient care. Overall, ten projects impacted all three mission areas. Participants noted that projects were valuable both as a learning tool as well as a way to gain visibility within the institution:

> The project was the most valuable part of the program. One, it taught you how to do a project. And also, it gave you something to be involved in [at Stanford] and gave you visibility (Female, Assistant Professor).

> [The program] was great. The best experience was the project. It's still ongoing and it's been a lasting product (Male, Assistant Professor).

Participants were asked to estimate how many individuals their projects had impacted since program completion: 8 (40 percent) estimated that their project had impacted 10 s of individuals; 5 (25 percent) estimated 100 s; and 7 (35 percent) reported that their SLDP projects had impacted 1000 s of individuals since implementation. This impact continues to grow:

> [My project] was fairly successful [at the time] – but the continued progress went beyond that. It's mushroomed. Now the benefit is an order of magnitude greater (Male, Assistant Professor).

> [The project] was something I planned to be doing anyway, but the course framework forced me to start it and create a systematic plan. The project was good in that it initiated great discussion and led to a more robust program. I had the right problem, but my initial solution was misguided and over the last 3-4 years, the solution has been refined. It has been a great return on investment (Male, Assistant Professor).

Finally, one of the most lasting pieces of the program beyond projects was the networking opportunity provided:

> The most lasting thing about [SLDP] is that meeting the other people helped me going forward. I learned how our interests were mutually beneficial. During the downtimes you get to know each other. Going forward, it has helped me because now I know these contacts and who to go to for different things (Male, Assistant Professor).

> I met people who I still have interactions with. That was the best. I made connections helpful from both work and personal perspectives. After 3 or 4 of the meetings, people were comfortable with each other and could say whatever (Female, Professor).

Discussion

Our study adds to research surrounding the growing importance of leadership development programs in general, and particularly in academic medicine (Fairchild *et al.*, 2004;

Schwartz and Pogge, 2000). In addition, this paper answers calls for research that includes both qualitative and long-term assessments of leadership programs (Frich *et al.*, 2015; Straus *et al.*, 2013; Throgmorton *et al.*, 2016). Our findings from a comprehensive, mixed-methods, long-term evaluation of one AMC's leadership development program suggest enduring impact for both individual participants and the organization as a whole. In particular, SLDP participants rated their leadership knowledge, skills, and attitudes higher than non-participants across a majority of survey items. In addition, participants were more likely to currently hold regional and national leadership titles and to have gained in leadership since nomination. Survey results also revealed the perceived importance of team building/management skills across leadership topics.

While no significant overall differences in promotion and retention rates emerged between participant and non-participant groups, there were significant differences by certain demographic characteristics. Specifically, Asian program participants had significantly higher odds of promotion since program nomination. Given the literature on effects of the "bamboo ceiling" in career advancement for Asian professionals and the dearth of Asian healthcare leaders in academic medicine, this result is meaningful as it provides one potential mechanism, inclusive leadership training, by which Asian health professionals may advance in their careers (Hyun, 2006; AAMC, 2017). Additionally, our data revealed that women program participants had significantly higher odds than their non-participant counterparts of remaining at the institution. This finding highlights the importance of perceived organizational support for retention and its potentially greater impact on women's turnover intentions (Eisenberger *et al.*, 2002; Jawahar and Hemmasi, 2006; Rhoads and Eisenberger, 2002).

Findings from qualitative interviews suggest that SLDP participants perceived value in program learning specific to current leadership roles. Importantly, however, leadership projects undertaken during the program have had lasting effects both for individual participants as well as for the institution, with most projects enduring to the present with continued impact, underscoring the importance of active learning projects (Raelin, 2006). Finally, while not formally part of program design, networking was perceived as particularly valuable. This result is critical, given research surrounding the importance of networks and the accumulation of social capital within organizations (Burt, 1995).

Limitations

Our study is limited by a few factors for future research to consider. First, our control group (program nominees who did not participate) is not representative of an ideal-type randomized controlled trial (RCT). It is not feasible to separate those who chose not to participate vs those not selected, and we recognize this limitation. However, all nominees were chosen based on high potential for leadership minimizing effects due to bias toward individuals already on a leadership path. We elected not to draw a comparison group from the general faculty population as this would not be representative. While our design is preferable to simple random sampling of the entire faculty population or to a pre-/post-design using changes in learner satisfaction scores (Frich *et al.*, 2015), future research could investigate RCTs for leadership program evaluation. This may prove difficult, however, as institutions expose rising leaders to leadership programs at critical career junctures, and being assigned to the control group could damage both future organizational and individual outcomes. Second, our study is representative of the experiences of all 213 program participants and non-participants from 2006 to 2011. While this is a sizable population from which to conduct this unique evaluation of long-term program effectiveness, the significance of our findings, particularly as related to specific demographic subgroups (i.e. women and Asian faculty) will benefit from continued monitoring as the program continues to grow. Third, responses to both survey and

interview questions may be influenced by recall bias as we asked respondents to make personal reflections on leadership abilities. Finally, our study has sampling bias as we lose insight from those who have left the institution.

Implications

Our study provides implications for research, practice, and society. Our methodological approach, including both quantitative and qualitative analyses of the long-term impact of a physician leadership program, provides a unique research perspective in the assessment of leadership training to date. The practical findings from this analysis indicate that an AMC's leadership program can have enduring impact both to individual physician leaders and the employer organizations in which they work. These results strengthen the case for physician leadership programs in healthcare organizations and AMCs, and provide empirical data for use by practitioners when proposing similar programs to stakeholders. Ultimately, continued evaluation of programs like SLDP can serve to assure that physician and academic physician leaders in particular are better equipped to lead their teams, make decisions, educate the next generation of physicians, and provide care to patients in a modern societal context which increasingly calls upon physicians to be at the forefront of a complex and continually changing healthcare landscape.

References

Association of American Medical Colleges (AAMC) (2010), *Medical School Based Career and Leadership Development Programs*, Washington, DC, available at: www.aamc.org/download/148998/data/careerandleadershipprograms.pdf (accessed November 15, 2016).

Association of American Medical Colleges (AAMC) (2013), "AAMC readiness for reform: transforming academic medicine", available at: www.staging.aamc.org/initiatives/r4r/ (accessed November 15, 2016).

Association of American Medical Colleges (AAMC) (2016), "Leadership development", available at: www.aamc.org/members/leadership/ (accessed October 2, 2016).

Association of American Medical Colleges (AAMC) (2017), "Diversity in the physician workforce: facts & figures 2014", available at: http://aamcdiversityfactsandfigures.org/ (accessed March 10, 2017).

Burt, RS (1995), *Structural Holes: The Structure of Competition*, Harvard University Press, Cambridge, MA.

Dannels, S.A., Yamagata, H., McDade, S.A., Chuang, Y.C., Gleason, K.A., McLaughlin, J.M., Richman, R.C. and Morahan, P.S. (2008), "Evaluating a leadership program: a comparative, longitudinal study to assess the impact of the executive leadership in academic medicine (ELAM) program for women", *Academic Medicine*, Vol. 83 No. 5, pp. 488-495.

Day, C.S., Tabrizi, S., Kramer, J., Yule, A.C. and Ahn, B.S., Program Leaders of the 2009-2010 Class of AAPOS Leadership Program Fellows (2010), "Effectiveness of the AAOS leadership fellows program for orthopaedic surgeons", *Journal of Bone and Joint Surgery*, Vol. 92 No. 16, pp. 2700-2708.

Eisenberger, R., Stinglhamber, F., Vandenberghe, C., Sucharski, I. and Rhoades, L. (2002), "Perceived supervisor support: contributions to perceived organizational support and employee retention", *Journal of Applied Psychology*, Vol. 87 No. 3, pp. 565-573.

Fairchild, D.G., Benjamin, E.M., Gifford, D.R. and Huot, S.J. (2004), "Physician leadership: enhancing the career development of academic physician administrators and leaders", *Academic Medicine*, Vol. 79 No. 3, pp. 214-218.

Frich, J.C., Brewster, A.L., Cherlin, E.J. and Bradley, E.H. (2015), "Leadership development programs for physicians: a systematic review", *Journal of General Internal Medicine*, Vol. 30 No. 5, pp. 656-674.

Goldring, E., Cravens, X., Porter, A., Murphy, J. and Elliott, S. (2015), "The convergent and divergent validity of the vanderbilt assessment of leadership in education (VAL-ED): instructional leadership and emotional intelligence", *Journal of Educational Administration*, Vol. 53 No. 2, pp. 177-196.

Ham, C. (2003), "Improving the performance of health services: the role of clinical leadership", *Lancet*, Vol. 361 No. 9373, pp. 1978-1980.

Ham, C., Clark, J., Spurgeon, P., Dickinson, H. and Armit, K. (2011), "Doctors who become chief executives in the NHS: from keen amateurs to skilled professionals", *Journal of the Royal Society of Medicine*, Vol. 104 No. 3, pp. 113-119.

Hickson, G.B., Pichert, J.W., Webb, L.E. and Gabbe, S.G. (2007), "A complementary approach to promoting professionalism: identifying, measuring, and addressing unprofessional behaviors", *Academic Medicine*, Vol. 82 No. 11, pp. 1040-1048.

Hopkins, J., Fassiotto, M., Ku, M.C., Mammo, D. and Valantine, H. (2017), "Designing a physician leadership development program based one effective models of physician education", *Health Care Management Review*, doi: 10.1097/HMR.0000000000000146.

Hyun, J. (2006), *Breaking the Bamboo Ceiling: Career Strategies for Asians*, Harper Collins Publishers, New York, NY.

Jawahar, I.M. and Hemmasi, P. (2006), "Perceived organizational support for women's advancement and turnover intentions: the mediating role of job and employer satisfaction", *Women Management Review*, Vol. 21 No. 8, pp. 643-661.

Kirkpatrick, D.L. and Kirkpatrick, J.D. (2006), *Evaluating Training Programs*, Berrett-Koehler Publishers, Inc., San Francisco, CA.

Lobas, J.G. (2006), "Leadership in academic medicine: capabilities and conditions for organizational success", *The American Journal of Medicine*, Vol. 119 No. 7, pp. 617-621.

Marquardt, M., Skipton, L., Freedman, A. and Hill, C. (2009), *Action Learning for Developing Leaders and Organizations: Principles, Strategies, and Cases*, American Psychological Association, Washington, DC.

National Center for Healthcare Leadership (2005), *National Center for Healthcare Leadership Health Leadership Competency Model: Summary*, National Center for Healthcare Leadership, Chicago, IL.

Raelin, J. (2006), "Does active learning promote collaborative leadership?", *Academy of Management Learning and Education*, Vol. 5 No. 2, pp. 152-168.

Rhoads, L. and Eisenberger, R. (2002), "Perceived organizational support: a review of the literature", *Journal of Applied Psychology*, Vol. 87 No. 4, pp. 698-714.

Russell, S.S. (2006), "An overview of adult-learning processes", *Urologic Nursing*, Vol. 26 No. 5, pp. 349-352, 370.

Schwartz, R.W. and Pogge, C. (2000), "Physician leadership: essential skills in a changing environment", *The American Journal of Surgery*, Vol. 180 No. 3, pp. 187-192.

StataCorp (2013), *Stata Statistical Software: Release 13*, StataCorp LP, College Station, TX.

Steinhilber, S. and Estrada, C.A. (2015), "To lead or not to lead? Structure and content of leadership development programs", *Journal of General Internal Medicine*, Vol. 30 No. 5, pp. 543-545.

Stoller, J. (2009), "Developing physician-leaders: a call to action", *Journal of General Internal Medicine*, Vol. 24 No. 7, pp. 876-878.

Straus, S., Soobiah, C. and Levinson, W. (2013), "The impact of leadership training programs on physicians in academic medical centers", *Academic Medicine*, Vol. 88 No. 5, pp. 710-723.

Strauss, A.L. and Corbin, J.M. (2008), *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*, Sage Publications, Inc., Thousand Oaks, CA.

Taylor, C.A., Taylor, J.C. and Stoller, J.K. (2008), "Exploring leadership competencies in established and aspiring physician leaders: an interview-based study", *Journal of General Internal Medicine*, Vol. 23 No. 6, pp. 748-754.

Throgmorton, C., Mitchell, T., Morley, T. and Snyder, M. (2016), "Evaluating a physician leadership development program – a mixed methods approach", *Journal of Health Organization and Management*, Vol. 30 No. 3, pp. 390-407.

Appendix 1. SLDP – long-term follow-up project interview guide

Thanks for taking the time to speak with me today. We are conducting a long-term follow-up of the Stanford Leadership Development Program. We hope to understand the impact of the program on past participants and on the School of Medicine and Stanford Hospitals:

(1) First of all, how would you describe your overall experience with SLDP?

(2) Do you remember the team project you worked on during the program?

- What did your project entail?

(3) How successful do you think your project was in meeting its objectives at the time of the program?

(4) Did your project change any practices or process within the School of Medicine and/or Stanford Hospitals?

- If yes, which ones?

(5) As you know, the three missions of the school span research, education, and patient care. Which of these three missions did your project have an impact on and in what specific ways (note, of course, that your project may have spanned more than one mission!)?

(6) Are the results that your project produced still being maintained today?

- (If yes) Would you say the gains have grown, remained the same, or lessened in impact?
- (If no) When and why did the projects' gains stop?

(7) How involved were your sponsor and coach in the development of your project?

(8) How many people has your project impacted since its start? 10, 100, or 1000 s?

(9) Are you or is someone else still measuring the success of your project?

- What metrics are you using to measure the long-term success of your project?
- Based on these metrics, how would you rate the long-term success of your project?

(10) Is there anything else you would like to share related to the Stanford Leadership Development Program or your project in particular?

Thanks so much again for your time today. We really appreciate all of the feedback you have provided us and we are looking forward to more great projects like yours!

About the authors

Dr Magali Fassiotto is an Assistant Dean at the Office of Faculty Development and Diversity, Stanford University School of Medicine, Stanford, California, USA. Dr Magali Fassiotto is the corresponding author and can be contacted at: magalif1@stanford.edu

Dr Yvonne Maldonado is the Senior Associate Dean for Faculty Development and Diversity, the Co-director of the Stanford Leadership Development Program, and a Professor and the Chief at the Department of Pediatrics, Division of Infectious Diseases, Stanford University School of Medicine, Stanford, California, USA.

Dr Joseph Hopkins is a Clinical Professor of Medicine and the Director of the Stanford Leadership Development Program at the Stanford University School of Medicine, Stanford, California, and an Associate Chief Medical Officer and the Senior Medical Director for Quality at Stanford Health Care, Stanford, California, USA.