Graduates' Perceptions of Learning Affordances in Longitudinal Integrated Clerkships: A Dual-Institution, Mixed-Methods Study

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Abstract

Purpose
The authors explored affordances that contribute to participants' successful learning in longitudinal integrated clerkships (LICs).

Method
This dual-institutional, mixed-methods study included electronic surveys and semistructured interviews of LIC graduates who completed their core clinical (third) year of medical school. These LIC graduates took part in LICs at Harvard Medical School from 2004 to 2013 and the University of North Carolina School of Medicine–Asheville campus from 2009 to 2013. The survey questions asked LIC graduates to rate components of LICs that they perceived as contributing to successful learning. A research assistant interviewed a subset of study participants about their learning experiences. The authors analyzed aggregate data quantitatively and performed a qualitative content analysis on interview data.

Results
The graduates reported multiple affordances that they perceive contributed to successful learning in their LIC. The most reported components included continuity and relationships with preceptors, patients, place, and peers, along with integration of and flexibility within the curriculum.

Conclusions
As LIC models grow in size and number, and their structures and processes evolve, learners' perceptions of affordances may guide curriculum planning. Further research is needed to investigate to what degree and by what means these affordances support learning in LICs and other models of clinical education.

Longitudinal integrated clerkships (LICs) are a form of clinical education growing in size and number in the United States, Canada, and Australia.[1] LICs are defined as the central element of clinical education whereby medical students participate in the comprehensive care of patients over time, participate in continuing learning relationships with these patients' clinicians, and meet the majority of the year's core clinical competencies, across multiple disciplines simultaneously through these experiences.[2] Rather than rotating through traditional block rotations (TBRs) every few weeks or months, LIC students care for and follow clinically diverse panels of patients longitudinally, across venues of care throughout the year.[3,4] Thereby, students have the opportunity to form longitudinal relationships with individual preceptors, patients, and peers.[3]

Growing evidence suggests that LICs support positive academic outcomes.[1] The literature reports that on content examinations (National Board subject and university-specific exams)[1,4–6] and clinical skills (objective structured clinical examinations),[4–6] LIC students' performance is at least equivalent to their counterparts in TBRs.[4–8] The literature also reports differences beyond academic tests; compared with peers, LIC students score higher on validated survey instruments assessing patient-centeredness immediately after[4,5] and four to six years after[9] their LIC. Qualitative studies report that LIC students feel strong commitment, advocacy, and a "sense of responsibility" toward patients,[10–12] and survey results demonstrate that physicians who previously completed LICs have a greater sense of patient advocacy than TBR-trained peers.[9] The literature also reports LIC students' increased sense of preparedness and satisfaction compared with TBR students.[1,4,5,9,12–20] In a review of LIC outcomes, Walters et al[1] call for new LIC studies to set aside "justification research," and encourage new "explanatory studies" that investigate the processes that underpin learning in LICs—that is, *why* LICs demonstrate their results. We considered this charge through the lens of learning affordances.[14,21]

Affordances are the qualities of a workplace that promote learning opportunities for the engaged participant.[21] Two studies have described LIC students' perceptions of affordances for learning during their LICs.[22,23] This study of affordances is the first, to our knowledge, to investigate students and physicians who *completed* their LIC (aka "LIC graduates") who are now beyond their core clinical year. We sought the perspective of LIC graduates (whether still in school, in residency, or beyond) as to their current sense of what served their learning in their prior LIC.

Method

Subjects and setting

We surveyed graduates from eight of the first nine LIC classes of the Cambridge Integrated Clerkship (CIC) at Harvard Medical School (HMS) who completed the program between 2004 and 2013, and

Please see the end of this article for information about the authors.

The authors have informed the journal that they agree that Robyn A. Latessa and Robert A. Swendiman have completed the intellectual and other work typical of the first author.

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Acad Med. XXXX;XX:00–00.
First published online
doi: 10.1097/ACM.0000000000001621

Supplemental digital content for this article is available at http://links.lww.com/ACADMED/A433.

graduates from the first four classes from the University of North Carolina School of Medicine (UNC SOM) Asheville LIC who finished in 2009–2013.

The HMS CIC has been described previously.[4,5] HMS students volunteer to enter a lottery for placement into the CIC, and selection occurs by random assignment. The CIC takes place at Cambridge Health Alliance (CHA), an academic community health system and the public hospital affiliated with HMS.

The UNC SOM Asheville LIC has been described previously.[24] Admission to the LIC program is based on indicated interest, with acceptance determined by the application and interview process. The Asheville LIC takes place at Mission Hospitals, Mountain Area Health Education Center, and within community physicians' private practices. The institutional review boards of HMS, CHA, and UNC Chapel Hill considered this study exempt.

Study design

We used a mixed-methods study design, including an electronic survey and semistructured, telephone interviews (Supplemental Digital Appendix 1 and 2 at http://links.lww.com/ACADMED/A433). The survey items (quantitative section) covered important topics identified from the literature and by experts in the field. The semistructured interviews (qualitative section) encouraged participants to expand upon and add to these a priori topics.

Quantitative. LIC graduates received an e-mail invitation to participate in this study including a participant information letter and a link to the anonymous, electronic survey. The survey response period was 11/11/13 to 12/30/13.

The 54-item survey included questions on sociodemographic characteristics, LIC affordances, and domains that affect learning such as psychological safety, professional accountability, burnout, quality of life, and professional satisfaction. In this study, we report the results of the 15 items related to affordances of LICs. All 15 items used a 5-point agreement scale ("strongly disagree" to "strongly agree"). We developed items by reviewing themes in the published LIC literature and by surveying members of the international Consortium of Longitudinal Integrated Clerkships listserv.

Qualitative. At the end of the electronic survey, an embedded link directed interested participants to another Web site with more information on an interview process and an opportunity to submit contact information. Twenty people scheduled and participated in the semistructured telephone interviews, the first 10 from each program. A trained research assistant (A.P.) with no involvement in either LIC program conducted the phone interviews between 12/5/2013 and 3/11/2014. A.P. recorded and transcribed interviews verbatim with permission. The interview guide consisted of four questions; responses to question one and four are the focus of the qualitative report: "What factors about your experiences in your third year longitudinal integrated curriculum do you think contributed most to your success?" and "Is there anything else you would like to add?" A.P. asked follow-up questions to clarify responses. All responses were included in the analysis. Total interview length ranged from 14 to 40 minutes, with a median of 25.5 minutes.

Data analysis

Quantitative. We coded the participants either as fourth-year medical students (LIC 2012–2013) or medical school graduates (LIC 2005–2011). We present aggregate results as percentage of respondents indicating high ratings ("agree to strongly agree" and "often to always") for each affordance.

Qualitative. Two researchers without connection to LIC programs, the interviewer (A.P.) and the primary coder (S.G.), performed the qualitative content analysis—a process of induction to identify the categories or themes that emerge from the interview scripts.[25–27] No coding software was used.

Each coder independently generated a list of themes based on review of five randomly selected interviews. The coders refined the coding system together and recoded the five interviews until reaching consensus. They coded the rest of the 15 interviews using the refined system, resolving discrepancies through discussion and revision of codes as needed. The two coders developed a comprehensive profile of all thematic categories of affordances and the relative frequency of each. The coders debriefed with one of the principal investigators, an LIC director (R.L.), to further clarify the meanings of overarching themes. A.P. and S.G. then worked collaboratively to verify the categorical and thematic structure. We used quotations to illustrate each theme and cited the participant number. To shorten long quotations, we used ellipses. Two researchers (A.P. and R.L.) reviewed each use of ellipses to ensure the final examples upheld the integrity and meaning of the interviewees' original quotations.

Results

Demographic characteristics

The overall response rate was 60/114 (52.6%) of LIC graduates. The site-specific rates were 20/26 (76.9%) of UNC SOM Asheville LIC graduates and 40/88 (45.5%) of HMS CIC graduates.

Among the LIC graduates was one class of fourth-year medical students. These students were distributed relatively evenly between sites: 6 (46.2%) students at Harvard and 7 (53.8%) at UNC SOM Asheville. Within the surveyed population, 13/60 (22%) were fourth-year students, and of the 20 interviewees, 5 were fourth-year medical students (25%). Resident and attending physicians were predominately graduates from HMS (34 [72.3%]; 13 [27.7%] from UNC SOM Asheville) and had graduated from medical school one to eight years ago with a median of two years. The majority of respondents practiced in a primary care specialty (Table 1).

Quantitative survey results

In response to general questions about their clerkship year, all 60 LIC graduates (100%) rated the LIC as highly successful at providing positive learning experiences. Most participants responded strongly positively to more detailed questions regarding their perceived importance of various affordances in the LIC learning environments (Table 2). The top affordances cited by 58 to 60 respondents (96.7%–100%) included continuity with site, authentic role in patient care, flexibility in schedule, continuity in relationship with preceptors, positive role-modeling behaviors, participation in patient-centered care, faculty teaching, and continuity of relationships with patients. Relationships with nurses and residents received the lowest rank of components contributing to a successful clerkship year.

Table 1

Characteristics of 60 UNC School of Medicine–Asheville and Harvard Medical School CIC Graduate Survey Participants, From a Dual-Institution Study of Learning Affordances in LICs, 2009–2013[a]

Demographic characteristic	Measure
Age	
Mean (SD)	29.9 (2.8)
Median (minimum–maximum)	29 (26–39)
Medical school, no. (%)	
UNC School of Medicine–Asheville	20 (33.3)
Harvard Medical School	40 (66.7)
Academic year of LIC, no. (%)	
2012–2013	13 (21.7)
2011–2012	12 (20.0)
2010–2011	13 (21.7)
2009–2010	6 (10.0)
2008–2009	7 (11.7)
2007–2008	4 (6.7)
2006–2007	3 (5.0)
2005–2006	0 (0)
2004–2005	2 (3.3)
Medical specialty, no. (%)	
Emergency medicine	6 (10.0)
Family medicine	12 (20.0)
General surgery	2 (3.3)
Internal medicine	11 (18.3)
Neurology	2 (3.3)
Obstetrics–gynecology	4 (6.7)
Ophthalmology	1 (1.7)
Orthopedic surgery	1 (1.7)
Otolaryngology	1 (1.7)
Pediatrics	6 (10.0)
Physical and rehabilitative medicine	1 (1.7)
Psychiatry	5 (8.3)
Radiation oncology	2 (3.3)
Other	
Pediatric neurology	1 (1.7)
Developmental/behavioral pediatrics	1 (1.7)
Internal medicine/pediatrics	3 (5.0)
Gastroenterology	1 (1.7)

Abbreviations: LIC indicates longitudinal integrated clerkship; UNC, University of North Carolina; CIC, Cambridge Integrated Clerkship.

[a]Data are presented for the four years available for the UNC LIC, 2009/2010–2012/2013.

Qualitative interview results

Interviewees discussed elements they felt supported successful learning in their LICs. The most-mentioned positive affordances included the continuity and relationships with preceptors and patients, the flexibility of the rotation schedules that included learner-centered half-days (unscheduled time called "white space"), integration, and continuity and relationships with the clerkship place and peers. Table 2 describes the themes and subthemes and their frequency. Figure 1 depicts each affordance such that the relative size of each pillar conveys the relative frequency of each affordance after combining the qualitative and quantitative data.

Continuity with preceptors. The majority of interviewees (17/20) described continuity with preceptors and how these relationships contributed to their learning and growth. LIC graduates expressed that these longitudinal relationships supported individualized learning plans, autonomy, and trust. They described valuing environments where it is safe to make mistakes and where they receive ongoing feedback and support of their growth. Several quotations were illustrative:

> They understand specifically what your weaknesses are, specifically where you can be challenged and also where you flourished.… They understood my aspirations as a medical student and for the future in terms of becoming a physician. A lot of their teaching was guided around my personal interests. I received a ton of feedback, a ton of opportunity with each individual preceptor for reflection. (Interviewee 12)

> I felt more comfortable with them and felt that it was safe to make mistakes.… I think that helped me work or push myself to go beyond my comfort zone. (Interviewee 1)

> They would give me really honest feedback. Over time their relationships really developed where they knew me more and more as a medical practitioner.… They saw me develop and they saw my strengths and weaknesses…. And we had more trust … which is something that I think is inherently nonexistent in any short-term, traditional school relationship. (Interviewee 16)

Continuity with patients. Many interviewees (13/20) discussed how longitudinal, meaningful relationships and authentic roles with patients enhanced learning. LIC students also described insight into their future role as doctors, ownership of patients, and a better understanding of patient perspectives. Two comments were particularly illustrative:

> Instead of just being a student who had a small role in their care, I got a sense of what it would feel like to be a provider and what it would feel like to get phone calls from your patients or e-mails from your patients or have to follow up and give them their lab results.… I got this sense of having a longitudinal relationship with a patient. And having them identify me as their provider and feeling invested in how they did over time, and loving that.… I remember so much better those things that were connected with a patient. I will never forget a patient with chronic cough…. I went home and tried to figure out why she had cough…. I was able to … see her back in two weeks … and I went with her to a specialist.… I remember everything about it.… Being able to follow a patient through the course of an illness was a big part of it. (Interviewee 8)

> I think you can really add something to their care because you know them so well and understand the reason she is not taking medicine is because she can't afford it. That really allows you to advocate for people and you know that doesn't happen if you don't spend four, five, or six visits talking with your patients and getting to know them.… I think once you have those experiences of getting to know someone and really being able to make a more meaningful impact as a medical student, then you get really excited to learn and read more and you put in your best every day because you know you can really make a difference. (Interviewee 10)

Flexibility. Nine interviewees talked about flexibility in daily schedules and unscheduled clinical time or "white space" built into the week. Many felt this flexibility allowed for learner-centered experiences such as time to learn about or connect with patients in additional care venues. One interviewee observed:

> Within our schedule, we had free time. And that was time you could use for reading about patients, but more often it was time you could do things like going to the hospital to check up on your other patients or you could go and work with subspecialties.… It gives you the opportunity to step outside of your typical rotations and see something different. It gives you the opportunity to fill in some of those continuity opportunities. It also just informs you so much on career choice. (Interviewee 17)

Table 2

LIC Learning Affordance Themes Described by UNC School of Medicine–Asheville and Harvard Medical School CIC Participants, From a Dual-Institution Study of Learning Affordances in LICs, 2009–2013

Themes and subthemes	Quantitative (agree–strongly agree), no. (%)	Qualitative, no. (%)
Continuity of relationships with preceptors	60 (100)	17 (85)
Positive role-modeling behaviors	59 (98.3)	4 (20)
Continuity of relationships with residents	29 (48.3)	3 (15)
Continuity of relationships with preceptors	59 (98.3)	—
Faculty teaching	58 (96.7)	—
Meaningful feedback	56 (93.4)	—
Continuity of relationships with specialty physicians	51 (85.0)	—
Know strengths and weaknesses/set goals/tailored–individualized learning	—	5 (25)
Trust/autonomy/responsibility	—	5 (25)
Ongoing feedback	—	4 (20)
Recognize growth, change, evolution	—	3 (15)
Safe to make mistakes	—	2 (10)
Continuity of relationships with patients	60 (100)	13 (65)
Actualizing service and advocacy	49 (81.7)	2 (10)
Authentic roles in patient care (meaningfully involved in provision of care)	60 (100)	—
Continuity of relationships with patients	58 (96.7)	—
Participation in patient-centered care	58 (96.7)	—
Understanding what it is like to be a doctor	—	5 (25)
Ownership	—	4 (20)
See patient perspective (self/family/within health systems)	—	4 (20)
Disease process/progression	—	2 (10)
Flexibility	59 (98.3)	9 (45)
Flexibility in schedule to facilitate self-directed learning	59 (98.3)	6 (30)
Flexibility in daily schedule	—	3 (15)
Integration	—	8 (40)
Medical knowledge	—	4 (20)
Holistic perspective patients	—	3 (15)
Holistic perspective medicine	—	1 (5)
Monthly ethics meeting–reflection	—	1 (5)
Grading process	—	1 (5)
Continuity of place	60 (100)	6 (30)
Continuity with site/system	60 (100)	—
Continuity of relationships with staff	43 (71.7)	—
Continuity of relationships with nurses	24 (40.0)	—
Learning community	—	4 (20)
Community-based setting (nonuniversity)	—	3 (15)
Continuity of relationships with peer group (third-year LIC students)	55 (91.7)	7 (35)
Continuity of relationships with peer group	55 (91.7)	4 (20)
Small size of peer group	—	3 (15)

Abbreviations: LIC indicates longitudinal integrated clerkship; UNC, University of North Carolina; CIC, Cambridge Integrated Clerkship.

Integration. Eight interviewees articulated how exposure to integration in the curriculum led to enhanced medical knowledge and appreciation of patients and medicine from a holistic perspective. Two comments were representative:

> Another thing that made it successful was the accumulation of knowledge over time. The fact that the knowledge base is built gradually over the entire year and I could keep coming back to the same place, and learn over time.… I kept using it and it was relevant all year. (Interviewee 8)

> I think the thing that helped me succeed the most in third year was doing it in a setting where you could really integrate between disciplines. It is really a unique opportunity where you can collaborate with preceptors and take different views on what is affecting your patient.… It was an incredible way to understand holistically what was going on with the patient. (Interviewee 12)

Continuity of place. Some interviewees (6/20) described being a part of a community with shared values. Interviewees described a sense of belonging and appreciated the opportunity to become part of a medical community and part of a patient community. Interviewees' observations included:

> I felt the mentorship was different in that because I was in one place and because I was in the longitudinal curriculum, I became a part of the medical community. (Interviewee 19)

> It's certainly the integrated clerkship that allowed me to tap into how passionate I feel about care that is close to patients and linked to their community, in a community hospital setting.… There is kind of a community closeness and understanding of the patients' environment and their culture. (Interviewee 14)

Continuity with peers. Several interviewees (4/20) talked about the benefits of quality relationships among peers together for a year. Benefits included a sense of belonging (forming bonds), enhanced engagement due to shared experiences, and a safe environment for reflection and support. One interviewee reflected:

> It really creates an environment of shared experience and I think it's an opportunity and place where you can have safe reflection and support … and just an opportunity for building a sense of connection with your colleagues that allows for better practice and better education. (Interviewee 14)

Discussion

The education literature describes "affordances"[14,21,28,29] as the invitational qualities and learning opportunities in

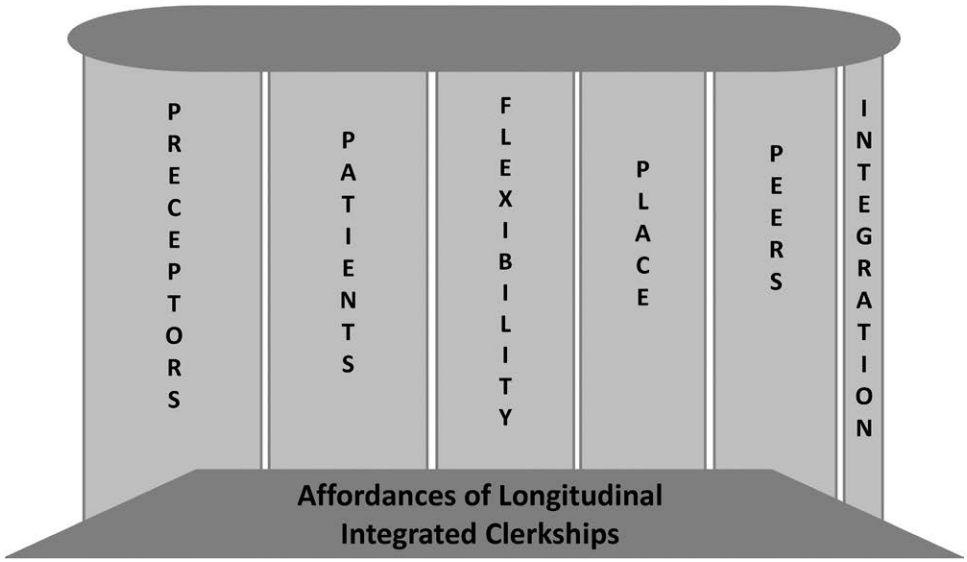

Figure 1 Schematic representation of relative importance of LIC learning affordance themes based on UNC School of Medicine–Asheville and Harvard Medical School CIC graduates' survey and semistructured interview responses. From a dual-institution study of learning affordances in 2009–2013. Abbreviations: LIC indicates longitudinal integrated clerkship; UNC, University of North Carolina; CIC, Cambridge Integrated Clerkship.

the workplace.[14] This study explored LIC graduates' perceptions of learning affordances in LICs. The LIC graduates reported an array of affordances in the LIC structure that they perceived contributed to their learning. Our analysis of quantitative and qualitative data suggests that LIC graduates valued particular elements of the LIC including continuity and relationships with one's preceptors, patients, place, and peers ("continuity of the 4Ps"); flexibility (e.g., unscheduled "white space"); and integration of learning.

Our findings mirror a recent study by Shahi et al[22] addressing the impact of workplace affordances on student participation in patient care. Shahi et al[22] show that community-hybrid and rural LICs provided more opportunities than tertiary hospitals for engagement and authentic roles in clinical activities. The authors described four themes that support learning: active participation, relationships, teamwork, and systems of clinical supervision.

Our study of LIC graduates in the United States and Shahi and colleagues' study of LIC students in Australia confirm similar affordances across different LIC models. Both studies identify affordances related to relationships with preceptors and active authentic participation by students in patient care. Relationships, continuity, and teaching by preceptors within the LIC model appear to enhance trust, autonomy, and engagement.[14,17,18,30,31] The literature describes the importance of trust as a critical element driving effective learning.[30,32] Trust is also a force that serves to foster caring.[33–35] Our findings and those of Shahi et al suggest that students identify and value LIC elements that foster engagement, empowerment, and sense of belonging.[10,12,13,16,18,35,36]

Our study suggests other affordances that contribute to learning: flexibility (unscheduled learner-centered half-days) and integration of the curriculum. Integration was recently defined by Ellaway and colleagues[37] as "the conceptual and practical connection between components, participants, and contexts in a training programme. The greater the integration, the more the components of a programme function as a single educational system." Walters and Brooks[38] further argue that preparing learners for practice requires that educators deliberately structure continuity, longitudinality, and integration. The affordances of flexibility and integration the students express in this study comport with Cooke and colleagues'[39] call in *Educating Physicians* for "standardization of learning outcomes and individualization of the learning process" and "integration of formal knowledge and clinical experience."

We focus on affordances in the core clinical year for medical students; Chen and colleagues'[23] recent study reinforces the need to prioritize attention to learning environments and workplace affordances in early clinical experiences such as "preclerkship" years. Their work and Billett's[21] indicate that affordances in a learning environment or workplace influence learners' willingness to engage meaningfully in activities. The impact of affordances on participation and engagement are key considerations for successful learning.[21,23] We agree, and we suggest that affordances that support learning in the core clinical year may inform how we create learning experiences in other medical education settings, including the "preclerkship" years.

The Pathways curriculum at HMS, launched in 2015, offers one example. Pathways is grounded in themes closely mirroring the affordances described in this study: increased relational continuity with peers, teachers, and patients; and flexibility.[40] Similar values are driving the Association of American Medical Colleges' Enhancing Pediatrics Across the Continuum project[41]; four medical schools are creating early longitudinal clinical experiences like mini-LICs to run alongside basic science courses.[41]

In traditional clinical clerkships, hybrid models might emerge that intentionally cultivate meaningful relationships, integration, and flexibility to promote engagement and learning. Medical schools may implement partial LICs to run alongside clinical blocks with the

elements of continuity and relationship of preceptors and patients, with some flexibility in learner-centered time.[3] Future research may also help determine additional affordances that might inform design of LICs, TBRs, hybrids, or new models; for example, what educational design elements foster trust, and how does trust function to advance learning and professional development in undergraduate and graduate medical education?[31,32] How can educational design contribute to creating affordances that foster caring?[33–36] To what degree and how can affordances arising from educational continuity[3] and integrated educational design[37,38,42] best support students' learning, retention, and professional development and broader patient, institutional, and societal missions?[43]

Limitations

This study examines only LIC graduates' perceptions of LIC affordances. We did not consider the opinions of current LIC students, TBR students or graduates, course directors, faculty preceptors, institutional leaders, interprofessional coworkers, or patients. We also do not know to what extent students' *perceptions* of affordances serve as a reliable proxy for *actual* affordances that foster learning. Another limitation is that we assessed affordances and did not report barriers to learning in this study. Although it is reassuring that our findings align with prior studies that include students from other institutions, another limitation stems from surveying LIC graduates from two institutions; results may not be generalizable to different LICs or non-LIC settings.

Conclusions

In this mixed-methods study, LIC graduates identified affordances that they perceive contributed to learning during their core clinical clerkship year: "continuity and relationships with the Ps" (preceptors, patients, place, and peers); flexibility; and integration. Further research should address *how* these and other affordances of the clinical environment support learning and professional development in LICs and beyond. Graduates' perceptions of learning affordances may offer a useful framework to advance educational research and educational design.[3,31,43]

Funding/Support: None reported.

Other disclosures: R.A. Latessa and D.A. Hirsh are directors of LIC programs. R.A. Swendiman was a student at the University of North Carolina School of Medicine Asheville LIC from 2011 to 2012.

Ethical approval: The institutional review boards of Harvard Medical School, the Cambridge Health Alliance, and the University of North Carolina–Chapel Hill considered this study exempt.

Previous presentations: Student perceptions of learning affordances in longitudinal integrated clerkships. Oral presentation at the Consortium of Longitudinal Integrated Clerkships International Conference; October 17, 2016; Toronto, Ontario, Canada.

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