The Relationship Between Academic Motivation and Lifelong Learning During Residency: A Study of Psychiatry Residents

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Abstract

Purpose
To examine the relationship between lifelong learning (LLL) and academic motivation for residents in a psychiatry residency program, trainee factors that influence LLL, and psychiatry residents' LLL practices.

Method
Between December 2014 and February 2015, 105 of 173 (61%) eligible psychiatry residents from the Department of Psychiatry, University of Toronto, completed a questionnaire with three study instruments: an LLL needs assessment survey, the Jefferson Scale of Physician Lifelong Learning (JeffSPLL), and the Academic Motivation Scale (AMS). The AMS included a relative autonomy motivation score (AMS-RAM) measuring the overall level of intrinsic motivation (IM).

Results
A significant correlation was observed between JeffSPLL and AMS-RAM scores (r = 0.39, P < .001). Although there was no significant difference in JeffSPLL and AMS-RAM scores based on respondents' level of training (senior vs. junior resident), gender, or age, analysis of AMS subdomains showed that junior residents had a significantly higher score on the extrinsic motivation identification domain (mean difference [M] = 0.38; 95% confidence interval [CI] [0.01, 0.75]; P = .045; d = 0.44) compared with senior residents. Clinician scientist stream (CSS) residents had significantly higher JeffSPLL scores compared with non-CSS residents (M = 3.15; 95% CI [0.52, 5.78]; P = .020; d = 0.57).

Conclusions
The use of rigorous measures to study LLL and academic motivation confirmed prior research documenting the positive association between IM and LLL. The results suggest that postgraduate curricula aimed at enhancing IM, for example, through support for learning autonomously, could be beneficial to cultivating LLL in learners.

Despite advances in medical education, graduates from medical training programs continue to struggle with translating new knowledge into improvements in health care quality.[1,2] In response to these challenges, many health care professionals have suggested that lifelong learning (LLL) is a vital component for integrating new evidence and scientific discoveries into practice.[2] LLL has been defined by Hojat and colleagues[3] as "an attribute involving a set of *self-initiated activities* and *information-seeking skills* with sustained *motivation* to learn and the ability to recognize one's own *learning needs*." Moreover, LLL has been reported to be an indicator of both competence and professionalism as well as a driver for continuing professional development.[2,4]

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As a result, professional organizations, such as the Royal College of Physicians and Surgeons of Canada and the Association of American Medical Colleges, have identified LLL as a core training competency and recommend that LLL training begin early in medical training.[5,6] In the most recent iteration of the CanMEDS competency framework, LLL is described as a core component of the Scholar role and has been defined by three enabling competencies: "(1) both planned and opportunistic learning as well as the need to integrate learning into daily work, (2) the use of data from a variety of sources to guide learning, and (3) continuous learning as an active part of a community of practice."[5] Further, the emergence of competency-based medical education has also resulted in greater emphasis on LLL as learners are expected to direct their own educational processes in this learner-centered approach to training.[7,8] Schumacher and colleagues[9] describe a framework for developing "master learners" for competency-based training, arguing that the creation of master learners requires an investment in developing professional learners who are able to seek external information to guide their learning and calibrate their self-assessments. Within this framework, LLL skill development is influenced by several learning theories, including self-determination theory, which explains motivation toward self-directed learning.[10,11]

Self-Determination Theory

The role of self-determination theory in medical education has been previously described in the literature.[12] Self-determination theory posits that motivation consists of a continuum ranging from amotivation, to extrinsic motivation (EM), to intrinsic motivation (IM), and that individuals can move through this continuum toward autonomous motivation by fulfilling three core needs—autonomy, competence, and relatedness—through their interactions with the environment.[13,14] IM, defined as an individual's pursuit of an activity as a result of personal interest and enjoyment, can be further subdivided into the following subdomains: the

motivation to know, to accomplish things, and to experience stimulation.[15] In contrast, EM is defined by a separable outcome, such as a reward or enhanced reputation. The progression from amotivation to IM reflects increasing self-determination, which has been purported to stimulate LLL.[16]

Hojat's Conceptualization of LLL

Hojat and colleagues[3,17,18] provide a comprehensive definition of LLL that encompasses four key concepts:

1. Self-initiated activities (behavioral aspect),
2. Information-seeking skills (capabilities),
3. Sustained motivation to learn (motivation), and
4. Ability to identify one's own learning needs (cognition).

This conceptualization of LLL overlaps with components of self-directed learning that have previously been described in the literature. For example, a systematic review of self-directed learning in health professions' literature resulted in the identification of seven key components of self-directed learning, including the identification of learning needs and of appropriate resources, both of which correspond to several components of Hojat and colleagues'[3,17,18] LLL definition, including the cognition and capabilities concepts, respectively.[19] However, the role of motivation to learn, a unique factor driving LLL in students, is not fully captured in many definitions of self-directed learning in medical education, with the exception of Garrison's[20] framework.

Relationship Between Academic Motivation and LLL

As far as we know, there are few studies exploring the relationship between academic motivation and orientation toward LLL. One study of 3,195 physician alumni from Jefferson Medical College (now Sidney Kimmel Medical College), Thomas Jefferson University, examined the association between physicians' responses on the Jefferson Scale of Physician Lifelong Learning (JeffSPLL), a measure of LLL, and 13 survey questions assessing learning motivation.[3] Results from this study showed significant positive correlations between JeffSPLL scores and responses to 11 of the 13 intrinsic learning motivation questions, and significant negative correlations with responses to the remaining 2 questions assessing EM. Another study involving third-term, first-year medical students reported a significant positive correlation between autonomous motivation (or IM) and reflection in learning, academic achievement, and intention to continue with studies.[16] These early findings suggest that academic motivation, and more specifically IM, could potentially increase orientation toward LLL during medical training. Although factors influencing LLL in practicing physicians[3] and medical students[16] have been identified, there are few studies that examine the influence of these factors on the LLL of postgraduate trainees,[21] and studies examining resident orientation toward LLL have not specifically examined residents' LLL practices, such as information-seeking behaviors and self-reflection.

The purpose of our study was to examine the relationship between LLL and academic motivation for residents in our psychiatry residency program. Our primary research questions were:

1. What components of academic motivation are associated with orientation toward LLL in psychiatry residents?
2. How does academic motivation and orientation toward LLL differ on the basis of psychiatry resident demographics, such as level of training, age, or participation in a research stream?

Our secondary purpose was to describe psychiatry residents' LLL practices, specifically their information-seeking behaviors, use of education technology for self-directed learning, and confidence in identifying their own learning needs.

We hypothesized that high scores in IM on the Academic Motivation Scale (AMS) relative autonomy motivation (AMS-RAM) measure would be positively correlated with orientation toward LLL on the JeffSPLL, and high scores in EM and amotivation would be negatively correlated with JeffSPLL scores. We also hypothesized that JeffSPLL scores would be lower for senior residents than junior residents and higher for residents participating in the clinician scientist stream (CSS) than non-CSS residents. Our hypothesis related to CSS versus non-CSS residents was based on previous studies using the JeffSPLL framework that demonstrated that academic clinicians (defined as spending more time on research and teaching) reported significantly higher orientation toward LLL on the JeffSPLL than full-time clinicians and primary care physicians.[3,17] Our hypothesis regarding senior versus junior residents was based on studies showing that readiness for self-directed learning declines over the course of health professions training.[22,23]

Method

Setting and participants

The study setting was the Department of Psychiatry, University of Toronto, which has the largest psychiatry residency program in Canada. The department comprises 19 hospital sites, 185 residents, and over 800 faculty. The University of Toronto psychiatry residency program is a five-year training program, starting with a rotating internship year that includes three months of psychiatry training. Core psychiatry residency training begins in the residents' second year, and residents take a series of examinations related to psychiatry certification starting in the latter part of their fourth year. Early in their training, residents can apply to pursue a CSS, which focuses on research training and, in some cases, pursuit of an advanced degree (e.g., master's degree). The residency program did not offer formal curricula on LLL at the time of this study; however, a transition-to-practice curriculum is offered to fifth-year residents that introduces them to maintenance of certification and the role of LLL.

Residents were eligible to participate in the study if they were currently enrolled in the University of Toronto psychiatry residency program and assigned to a psychiatry residency rotation. At the time of the study (see below), 173 psychiatry residents were eligible to participate (12 of the 185 residents were on professional leave). We distributed questionnaires after all eligible participants had an opportunity to review a study information sheet. The questionnaires were completed anonymously, and we considered consent

to participate as implied by the completion of the questionnaire. Participants did not receive an incentive for participation. This study was approved by the institutional review boards of the University of Toronto and the University of Illinois at Chicago.

Study measures

The questionnaires that were distributed to all eligible participants included three study instruments: an LLL needs assessment survey, which characterized trainees' self-directed learning practices; the JeffSPLL, which measured trainees' orientation toward LLL; and the AMS, which measured trainees' academic motivation using a self-determination theory framework.

We developed the LLL needs assessment survey based on a review of existing LLL definitions[3,7,17] and previously described competency domains for continuing professional development.[24] We developed the survey questions through an iterative process based on feedback from psychiatry trainees and educators at the University of Toronto. The final needs assessment survey consisted of 16 questions on participant demographics, such as age (categorized by five-year intervals to maintain anonymity), gender, and medical school; information-seeking behaviors; use of technology for self-directed learning; and motivation for self-directed learning. Question response options were either categorical or on a five-point Likert scale, where 1 = strongly disagree and 5 = strongly agree. We piloted the Likert scale section of the survey with 10 residents in the University of Toronto psychiatry residency program prior to administering it to the entire psychiatry resident sample.

We used the JeffSPLL (a 14-item tool) to assess an individual's orientation toward LLL.[3,25] The 14-item JeffSPLL was derived from a longer initial version with 19 items. The scores for this shorter version range from 14 to 56, with each item rated on a 4-point Likert-like scale, where 1 = strongly disagree and 4 = strongly agree. The JeffSPLL also consists of three factors: learning beliefs and motivation (JeffSPLL-beliefs), attention to learning opportunities (JeffSPLL-attention), and technical skills in seeking information (JeffSPLL-skills). The JeffSPLL scale's reliability (Cronbach alpha) was measured as 0.77 to 0.86 in previous studies.[3,16,17]

We used the AMS developed by Vallerand and colleagues[15,26] to assess learner motivation. The AMS assesses motivation across the self-determination theory continuum and measures motivation in three domains: IM, EM, and amotivation. The AMS consists of 28 items that, for the purposes of our study, explored the reasons why trainees are pursuing psychiatry residency training. We modified the items on the AMS, which were originally designed for university students and used with medical students,[27] for our psychiatry resident sample. Items on the AMS are scored on a 7-point Likert-like scale, where 1 = not at all and 7 = exactly. The AMS is divided into 7 subscales, which contain 4 items each: 3 subscales are related to IM, 3 are related to EM, and 1 is related to amotivation. The 3 IM subscales (hereafter subdomains) are to know (engaging in an activity for the pleasure of learning), to accomplish things (engaging in an activity for the pleasure experienced when attempting to accomplish something), and to experience stimulation (engaging in an activity to experience stimulating sensations).[15] The 3 EM subscales (hereafter subdomains) are external regulation (learning behavior regulated by external means and rewards), introjected regulation (individual begins to internalize reasons for learning behavior), and identification (internalization of EMs). In addition, the AMS generates a relative autonomy motivation score (the AMS-RAM), which is an overall measure of motivation incorporating both controlled and autonomous motivation.[28] The AMS-RAM is calculated by summing the following variables and their weighted scores: overall IM (+2), identified regulation (+1), introjected regulation (–1), and external regulation (–2).[29] AMS-RAM scores range from −18 to +18, with higher scores indicating greater autonomous motivation. The AMS reliability was measured as 0.76 to 0.86 except for the identified regulation (identification subdomain), which was 0.60, in a junior college student sample.[26]

Procedure

Between December 2014 and February 2015, we recruited 105 of the 173 (61%) eligible postgraduate year 1 (PGY1) to postgraduate year 5 (PGY5) residents for the study six months into their respective training year (e.g., PGY1 residents who had completed six months of their first year). A recruitment e-mail with the study consent form was sent through a central department e-mail list. The recruited psychiatry residents provided implied consent to participate by completing the study questionnaire, after reviewing a study information sheet, at centralized resident teaching sessions. A research assistant (S.Y.) distributed the questionnaire at the centralized resident teaching sessions and collected completed questionnaires at the conclusion of the sessions.

Data analysis

We entered data into SPSS Statistics version 20.0 (IBM, Armonk, New York) for analysis. We report means and standard deviations (SDs) for continuous variables and raw numbers and percentages for categorical variables. On the basis of discussions with psychiatry educators and residents, we grouped residents in PGY1–PGY2 and PGY3–PGY5 into junior and senior resident categories, respectively. We analyzed differences in JeffSPLL and AMS scores between junior and senior residents and between CSS and non-CSS residents using Student *t* tests. We report mean differences (M) and 95% confidence intervals (CIs) for JeffSPLL and AMS-RAM scores. We analyzed differences in categorical variables between groups using chi-square analyses. As a subanalysis, we also conducted a one-way analysis of variance to compare mean scores on the JeffSPLL and AMS-RAM for residents in each training year and age category. We conducted post hoc comparisons using a Tukey test to compare differences in JeffSPLL and AMS-RAM scores across training years. In addition, we used Pearson correlations to analyze the association between JeffSPLL and AMS-RAM domain scores and performed a simple linear regression analysis to predict JeffSPLL scores on the basis of AMS domains scores. We defined statistical significance as $P < .05$ and calculated Cohen *d* effect size for significant findings on trainee factors associated with JeffSPLL and AMS scores.

Results

Demographics

A total of 105 of the 173 eligible psychiatry residents participated in the study (response rate = 61%). The

Table 1

Pearson Correlations Between JeffSPLL and AMS Domains for Psychiatry Residents (n = 105), Department of Psychiatry, University of Toronto, December 2014 to February 2015

Domain	JeffSPLL (*r*)	*P* value
AMS-RAM	0.39	< .001
AMS intrinsic motivation		
To know	0.46	< .001
To accomplish things	0.35	< .001
To experience stimulation	0.23	.021
AMS extrinsic motivation		
External regulation	−0.20	.047
Introjected regulation	0.01	.947
Identification	0.09	.360
AMS amotivation	−0.029	.774

Abbreviations: JeffSPLL indicates Jefferson Scale of Physician Lifelong Learning; AMS, Academic Motivation Scale; RAM, relative autonomy motivation.

majority of the participants were female (65; 62%) and were 26 to 30 years old (69; 66%), followed by 31 to 35 years old (27; 26%). The distribution of resident respondents across training years was 20 (19%) for PGY1, 18 (17%) for PGY2, 25 (24%) for PGY3, 20 (19%) for PGY4, and 20 (19%) for PGY5 residents, with 2 respondents not indicating their training year. Residents in the program completed their medical degree from 15 different medical schools in Canada, with the University of Toronto (17; 16%) and McMaster University (17; 16%) being the most common. Thirteen (12%) respondents graduated from international, including U.S., medical schools. Sixteen (15%) respondents were in the CSS, with no significant difference between the proportion of junior (8/38; 21%) and senior (8/65; 12%) residents who were in the CSS ($P = .214$). Two respondents did not indicate their CSS status. There was no significant difference between junior and senior resident respondents' medical school or gender; however, a significantly higher proportion of senior residents (24/65; 37%) compared with junior residents (3/38; 8%) were 31 to 35 years old ($P = .006$). There was no significant difference in respondent medical school, gender, or age category between CSS and non-CSS respondents.

Relationship between JeffSPLL and AMS domains

Respondents' mean scores were 41.08 (SD = 4.99) for the JeffSPLL and 3.72 (SD = 3.65) for the AMS-RAM. Pearson correlations between JeffSPLL and AMS domain scores are summarized in Table 1. JeffSPLL scores were significantly correlated with AMS-RAM scores ($r = 0.39$; $P < .001$). For the IM domain, JeffSPLL was significantly positively associated with IM to know ($r = 0.46$; $P < .001$), to accomplish things ($r = 0.35$; $P < .001$), and to experience stimulation ($r = 0.23$; $P = .021$). For the EM domain, only EM through external regulation was significantly negatively correlated with JeffSPLL scores ($r = −0.20$; $P = .047$). Amotivation was not significantly associated with JeffSPLL scores.

Analysis of JeffSPLL factor scores also showed significant correlations with AMS subdomains. JeffSPLL-belief was significantly positively correlated with IM to know ($r = 0.40$; $P < .001$) and modestly positively correlated with IM to accomplish things ($r = 0.23$; $P = .17$); JeffSPLL-belief was also significantly negatively correlated with EM external regulation ($r = −0.30$; $P = .002$) and amotivation ($r = −0.25$; $P = .010$). JeffSPLL-attention was significantly positively correlated with the following AMS subdomains: IM to know ($r = 0.33$; $P = .001$), IM to accomplish things ($r = 0.32$; $P = .001$), and IM to experience stimulation ($r = 0.30$; $P = .002$). JeffSPLL-skills was significantly positively correlated with IM to know ($r = 0.28$; $P = .004$) and negatively correlated with EM external regulation ($r = −0.20$; $P = .037$).

Using the single questionnaire item assessing residents' self-rated motivation for self-directed learning, 74 (70%) respondents indicated that they were highly motivated (defined as an answer of very high or high motivation on the five-point scale) for self-directed learning, and there was no significant difference based on junior versus senior resident status. JeffSPLL scores were significantly higher in respondents self-rated as highly motivated for self-directed learning on this single item, as compared with respondents self-rated as unsure or low motivation (mean = 42.2 [SD = 4.3] vs. mean = 38.4 [SD = 5.7], $P < .001$, $d = 0.75$). There was no significant difference on AMS-RAM scores for highly motivated residents as defined by this single item.

Trainee factors associated with JeffSPLL and AMS scores

There was no significant difference in JeffSPLL and AMS-RAM scores between junior and senior residents (Table 2). Analysis of AMS subdomains showed that junior residents had a significantly higher score on the EM identification subdomain (M = 0.38; 95% CI [0.01, 0.75]; $P = .045$; $d = 0.44$) compared with senior residents. There were no other significant differences in AMS subdomains between junior and senior residents. Additionally, CSS residents had significantly higher JeffSPLL scores compared with non-CSS residents (M = 3.15; 95% CI [0.52, 5.78]; $P = .020$; $d = 0.57$) (Table 3). Analysis of JeffSPLL factors showed that CSS residents, as compared with non-CSS residents, had significantly higher JeffSPLL-skills (M = 1.91; 95% CI [0.80, 3.20]; $P = .001$; $d = 0.84$) and JeffSPLL-attention (M = 1.20; 95% CI [0.90, 2.31]; $P = .034$; $d = 0.54$) scores, but there was no significant difference in JeffSPLL-belief scores between these groups. There were no significant differences between CSS and non-CSS residents on AMS-RAM or IM, EM, or amotivation scores.

Analysis for individual training years showed that PGY1 residents had significantly higher JeffSPLL scores compared with PGY2 residents (M = 5.91; 95% CI [1.65, 10.20]; $P = .002$; $d = 1.21$), but no other significant differences in JeffSPLL scores were identified between the remaining training years. There was no significant difference in AMS-RAM scores when comparing participants by residency year. In addition, JeffSPLL and AMS-RAM scores did not significantly

Table 2

Differences in Lifelong Learning and Academic Motivation[a] Between Junior and Senior Psychiatry Residents (n = 105), Department of Psychiatry, University of Toronto, December 2014 to February 2015

Domain	Resident group, mean (SD)		*P* value
	Juniors (n = 38)	Seniors (n = 65)	
JeffSPLL	41.18 (5.68)	41.05 (4.61)	.898
AMS-RAM	4.20 (4.60)	3.44 (3.01)	.371
AMS intrinsic motivation			
To know	5.41 (0.95)	5.27 (0.97)	.506
To accomplish things	4.29 (1.20)	4.23 (1.31)	.820
To experience stimulation	4.11 (1.23)	3.70 (1.37)	.138
AMS extrinsic motivation			
External regulation	3.59 (1.58)	3.63 (1.29)	.884
Introjected regulation	3.50 (1.43)	3.40 (1.58)	.727
Identification	5.68 (0.72)	5.30 (1.00)	.045
AMS amotivation	1.79 (0.91)	1.84 (1.10)	.797

Abbreviations: SD indicates standard deviation; JeffSPLL, Jefferson Scale of Physician Lifelong Learning; AMS, Academic Motivation Scale; RAM, relative autonomy motivation.
[a]Lifelong learning was measured by the JeffSPLL, and academic motivation was measured by the AMS.

differ across age categories, gender, or trainees' medical school.

Psychiatry residents' self-reported LLL behaviors

Table 4 summarizes responses to five-point Likert scale questions exploring residents' information-seeking behaviors and motivation for self-directed learning. Most residents reported reflecting on and assessing their individual learning needs sometimes (45; 43%) or often (42; 40%). Moreover, most respondents were very (34; 32%) or moderately (54; 51%) confident in their ability to problem solve if they encountered a clinical situation that they had not been exposed to in their training. In instances where residents identified a need for further training in a practice area, respondents felt very (36; 34%) or moderately (53; 50%) confident in their ability to pursue appropriate learning. Respondents who reported feeling extremely or very confident in their ability to pursue further learning had significantly higher JeffSPLL-skills (M = 0.91; 95% CI [0.08, 1.75]; $P = .033$; $d = 0.44$) and JeffSPLL-attention scores (M = 0.88; 95% CI [0.08, 1.69]; $P = .025$; $d = 0.44$) than respondents who reported feeling moderately, slightly, or not at all confident. There were no significant associations for other JeffSPLL factor scores when comparing high and low Likert ratings for the remaining Table 4 items.

Table 3

Differences in Lifelong Learning and Academic Motivation[a] Between CSS and Non-CSS Psychiatry Residents (n = 105), Department of Psychiatry, University of Toronto, December 2014 to February 2015

Domain	Resident group, mean (SD)		*P* value
	CSS (n = 16)	Non-CSS (n = 87)	
JeffSPLL	43.78 (6.28)	40.63 (4.60)	.020
AMS-RAM	4.79 (5.10)	3.51 (3.33)	.347
AMS intrinsic motivation			
To know	5.63 (0.75)	5.27 (0.98)	.172
To accomplish things	4.09 (1.38)	4.28 (1.26)	.595
To experience stimulation	3.96 (1.32)	3.83 (1.34)	.723
AMS extrinsic motivation			
External regulation	3.32 (1.90)	3.68 (1.26)	.340
Introjected regulation	5.31 (0.66)	5.45 (0.97)	.210
Identification	5.45 (0.97)	5.31 (0.66)	.592
AMS amotivation	2.02 (1.20)	1.80 (1.01)	.446

Abbreviations: CSS indicates clinician scientist stream; SD, standard deviation; JeffSPLL, Jefferson Scale of Physician Lifelong Learning; AMS, Academic Motivation Scale; RAM, relative autonomy motivation.
[a]Lifelong learning was measured by the JeffSPLL, and academic motivation was measured by the AMS.

With respect to information-seeking behavior as part of LLL, respondents indicated that they use the Internet (61; 58%), scholarly literature (35; 33%), discussion with a peer or colleague (34; 32%), and a mentor (24; 23%) to search for information. Overall, 66 (63%) respondents indicated that they felt they had the appropriate learning tools to succeed with respect to information seeking.

Respondents indicated that the two most common technologies used for their self-directed learning were their laptop (62; 59%) and mobile phone devices (35; 33%), while the least often used were print copies of books or journals (5; 5%) and their tablet (6; 6%). With respect to preferred methods for self-directed learning online, respondents preferred to directly access online journals (45; 43%) and specialized Web sites on topics (43; 41%) as compared with online decision aides (18; 17%) or online courses (5; 5%).

Discussion

As hypothesized, our results confirmed a significant positive correlation between JeffSPLL and AMS-RAM scores, although this correlation was modest in strength. Contrary to our hypothesis, there was not a significant association between JeffSPLL scores and either EM or amotivation scores. In addition, we found that JeffSPLL and AMS-RAM scores did not vary significantly between senior and junior residents. However, although there was no significant difference between CSS and non-CSS residents' AMS-RAM scores, CSS residents did have significantly higher JeffSPLL scores than non-CSS residents.

It is important to note that mean JeffSPLL scores for psychiatry residents in our sample (41.08 [SD = 4.99]) were lower than scores reported in samples

Table 4

Psychiatry Residents' (n = 105) Self-Reported Information-Seeking Behaviors and Motivation for Self-Directed Learning, Department of Psychiatry, University of Toronto, December 2014 to February 2015

Item	Responses, no. of respondents (%)				
	Very often/ extremely	Often/ very	Sometimes/ moderately	Rarely/ slightly	Very rarely/ not at all
How often do you reflect on and assess your individual learning needs?	9 (9)	42 (40)	45 (43)	7 (7)	2 (2)
How confident are you in your ability to independently problem solve if you encounter a clinical situation you were not exposed to in your training?	9 (9)	34 (32)	54 (51)	6 (6)	2 (2)
How confident do you feel about your ability to pursue the appropriate learning?	8 (8)	36 (34)	53 (50)	6 (6)	2 (2)

involving practicing clinicians (46.2 [SD = 5.5]),[3] pediatric residents (43.0 [SD = 4.8]),[21] and medical students (43.5 [SD = 4.7]).[25] However, mean JeffSPLL scores for CSS residents in our sample (43.78 [SD = 6.28]) were comparable to pediatric resident[21] and medical student[25] JeffSPLL scores. It is unclear whether the lower JeffSPLL scores in our sample were unique to psychiatry or the residency program. Nonetheless, residents' self-reported confidence in pursuing LLL was relatively high, with 84% of residents indicating that they were moderately or very confident in their ability to pursue appropriate learning. This finding is likely due to residents' poor ability to self-assess their strengths and weaknesses, a finding that has been well established in the literature.[30–32]

Our results provide additional support for Schumacher and colleagues'[9] framework for developing the master learner and underscore the importance of self-determination theory for understanding the factors that foster lifelong learners. In a study of medical students, Sobral[16] demonstrated a significant association between IM and reflection in learning and intention to continue learning. Although Sobral found that controlled motivation (or EM) was significantly correlated with reflection in learning and a meaning orientation approach to studying, these correlations were quite small ($r = 0.09$ and $r = 0.05$) and could explain why we did not observe a significant association between JeffSPLL and EM scores.

Moreover, Hojat and colleagues[3] showed significant correlations between the JeffSPLL and 11 survey questions related to intrinsic learning motivation in practicing physicians. Their study also showed a negative correlation between the JeffSPLL and questions related to EM, which differed from our findings and could be explained by our use of the AMS to assess motivation and our focus on trainees as distinguished from practicing physicians.

Similar to Ryan and Deci,[14] we found higher EM identification scores for junior residents, which suggests that junior residents consciously value learning and that motivation to learn is somewhat internalized. This also suggests that junior residents move from autonomous motivation to controlled motivation as they move into their senior years. Interestingly, PGY1 residents had significantly higher scores on the JeffSPLL compared with PGY2 residents, which suggests greater orientation toward LLL early in the first year of psychiatry training. It is possible that this is a result of preexisting orientations to LLL from medical school, which is reinforced by comparable JeffSPLL scores seen in medical students.[25] It is also possible that the PGY1 training year resembles the frequent rotation transitions and training experience of medical school and thereby continues to train residents to be more self-regulated learners, fostering greater orientation toward LLL. This link has been reported in students learning in problem-based learning formats rather than in the traditional pedagogy.[33] Lastly, the difference between PGY1 and PGY2 residents with regard to orientation toward LLL could also be a product of specific teaching and training approaches used in the first six months of their second training year. Although previous studies provide some insights into potential explanations for these findings,[25,33] it is clear that further research is needed to identify potential factors influencing EM identification scores.

Although there was a decline in JeffSPLL scores from junior to senior residency, the difference in scores did not achieve statistical significance. These findings are in contrast with a cohort study of medical students at the University of Saskatchewan, which showed a significant decline in readiness for self-directed learning over the course of medical and dentistry training.[22,23] The differences between our study results and these studies could be explained by differences in study measures (JeffSPLL vs. Guglielmino's Self-Directed Learning Readiness Scale) and in their longitudinal methodology.

The results of our study support the need to develop and maintain IM during residency training, given its salient role in increasing orientation toward LLL. Consistent with self-determination theory, IM is created from three physiological needs: autonomy, competence, and relatedness. Orsini and colleagues[34] conducted a systematic review exploring how IM can be encouraged in undergraduate students in clinical teaching environments. In this review, they recommend supporting autonomy through identifying student learning needs, using different learning approaches, promoting active participation, and giving learners responsibility and choices in their learning. They also recommend supporting competence by providing optimal challenges, providing structured guidance, and giving constructive and

positive feedback. Biondi and colleagues[35] describe a similar process but use the concept of scaffolding, which involves supporting the learner through different stages of learning until the learner can perform the activity on their own.[36] The development of feedback-rich curricula where students receive greater formative and constructive feedback is likely to further enhance IM and orientation toward LLL.[34,35]

Furthermore, Kusurkar and colleagues[37,38] suggest that motivation can be enhanced through recent medical curricula developments such as horizontally and vertically integrated curricula, problem-based learning, experience-based learning, and longitudinal integrated curricula. Studies have also shown that academic clinicians have greater orientations to LLL than clinicians exclusively focused on patient care,[3,18] which further supports the role of research training and experiences in cultivating LLL in residency training.

The following limitations should be considered when interpreting our study results. First, our study was a cross-sectional study, and changes in JeffSPLL and AMS scores across trainee subgroups may have resulted from following the same cohort of residents longitudinally. Second, although our response rate was over 60%, it is possible that our sample is not representative of all trainees in the program. Our response rate, however, is comparable to response rates for similar LLL studies.[17,18] Third, our findings may be specific to psychiatry residents and/or our program at the University of Toronto. Nevertheless, the psychiatry department at the University of Toronto is a large multisite institution with 19 training sites and provides a breadth of training contexts that could support the generalizability of our findings to other programs and sites. Fourth, factors influencing resident selection into the CSS were not accounted for in this study and may limit interpretation of our research-stream-related findings.

Future studies should focus on exploring the association between IM and LLL in other postgraduate medical training programs outside of psychiatry. There is a paucity of literature on the role of academic motivation in LLL in postgraduate settings, and evidence from other specialty programs and settings is needed to provide further support for developing curricula to increase IM and orientation toward LLL in trainees. Additional research on longitudinal changes in JeffSPLL scores, and corresponding changes to IM, across learner contexts is also needed to elucidate long-term trends in these domains and could provide insights into long-term trajectory and inform curriculum development to foster LLL. Moreover, qualitative research may provide further insights into our understanding of barriers and facilitators to increasing LLL during residency training.

In summary, this is one of a few studies that we know of examining the relationship between academic motivation and orientation toward LLL in a postgraduate setting. Our use of rigorous measures to study LLL and academic motivation confirmed prior research documenting the positive association between IM and LLL. The results suggest that postgraduate curricula aimed at enhancing IM—for example, through support for learning autonomously—could be beneficial to cultivating LLL in learners. Additional factors influencing the relationship between academic motivation and LLL require further exploration in longitudinal and qualitative studies.

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