

The Relationship between Academic Motivation and Lifelong Learning in Psychiatry Residents

BY

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THESIS

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## LIST OF ABBREVIATIONS

AAMC	Association of American Medical Colleges
AMS	Academic Motivation Scale
CBME	Competency-based medical education
CPD	Continuing professional development
EM	Extrinsic motivation
IM	Intrinsic motivation
JSLL	Jefferson Scale of Lifelong Learning
LLL	Lifelong learning
PGY	Postgraduate year
RCPSC	Royal College of Physicians and Surgeons of Canada
SDI	Self-determination index
SDL	Self-directed learning
SDT	Self-determination theory

## SUMMARY

Lifelong learning (LLL) is a core training competency across the learner continuum and motivation to learn is one factor influencing the development of lifelong learners. The purpose of this study was to elucidate the relationship between LLL and academic motivation during postgraduate training, specifically in psychiatry residency training. We also studied trainee factors that may influence LLL during residency training.

One hundred and five (105) of 173 psychiatry residents from the University of Toronto participated in this cross-sectional study examining orientation to LLL and academic motivation, specifically intrinsic motivation (IM), extrinsic motivation (EM) and amotivation. Residents completed a questionnaire characterizing self-directed learning practices, LLL and academic motivation.

Participants' orientation to LLL was significantly correlated with academic motivation total scores and with IM scores. There was no significant correlation between LLL and either EM or amotivation sub-scales. There was no significant difference in LLL or academic motivation scores based on respondents' training year, gender, or age; however, residents participating in the research training stream had significantly higher orientations to LLL than non-research stream residents.

Therefore, our results reinforce the association between IM and LLL during residency training. The incorporation of teaching and curricula to support autonomous motivation in postgraduate medical education may be beneficial to the development of LLL skills for practice.



# 1. INTRODUCTION

## **1.1 Background**

Despite the advances in medical education, graduates from medical training programs continue to struggle with translating new knowledge into improved quality of healthcare (Lucey 2013, Murdoch-Eaton and Whittle 2012). In response to these challenges, many healthcare professionals have suggested that lifelong learning is a vital component to address and bridge these gaps, resulting from the rapid pace of new evidence and scientific discoveries (Murdoch-Eaton and Whittle 2012). Lifelong learning (LLL) has been defined 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” (Hojat, Veloski, and Gonnella 2009). Moreover, LLL has been reported to be an indicator of both competence and professionalism (Arnold 2002, Li, Paterniti, et al. 2010, Murdoch-Eaton and Whittle 2012) and a driver for continuing professional development (CPD).

As a result, professional organizations, such as the Royal College of Physicians and Surgeons of Canada (RCPSC) and the Association of American Medical Colleges (AAMC) have identified LLL as a core training competency and recommend that LLL training begin earlier in medical training (Frank and Snell 2014, The Informatics Panel and the Population Health Perspective Panel 1999). In the most recent iteration of the CanMEDS 2015 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” (Frank, Snell and Sherbino 2014, 7). Further, the emergence of competency-based medical education (CBME) has

also placed greater importance on LLL as learners are expected to direct their own educational processes in this learner-centered approach to training (Albanese et al. 2009, Carraccio et al. 2002).

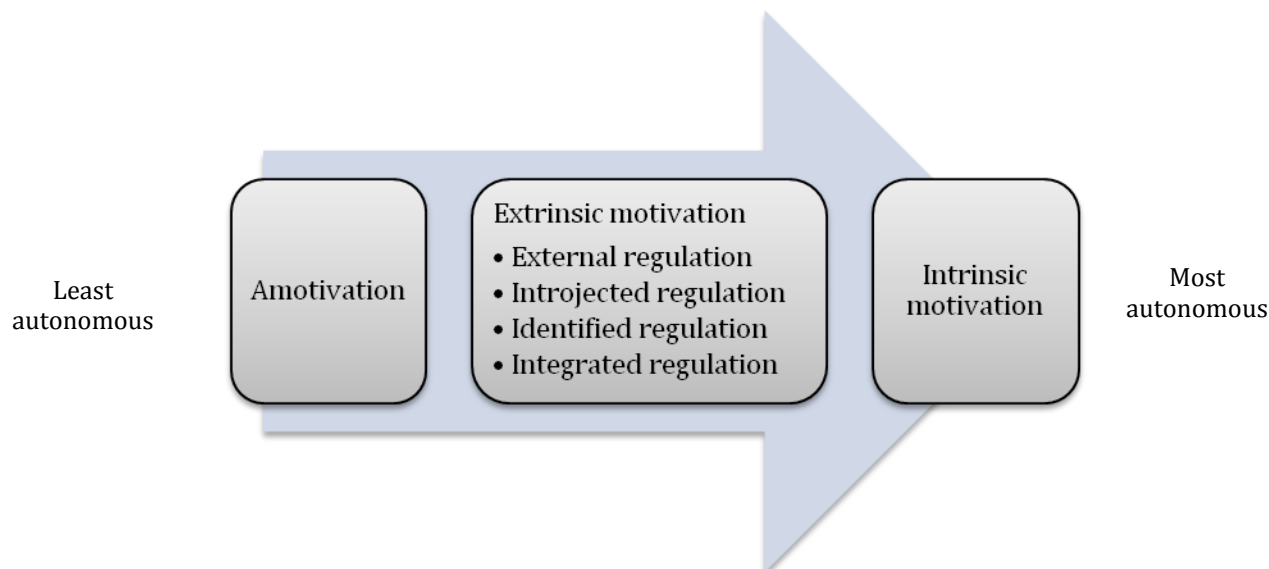
Schumacher and colleagues describe a framework for developing “master learners” for competency-based training. They argue that the creation of these “master learners” requires an investment in developing professional learners who are able to seek external information to guide their learning and calibrate their self-assessments (Schumacher, Englander, and Carraccio 2013). Within this framework, LLL skill development is influenced by several learning theories, including self-determination theory (SDT), which explains motivation towards self-directed learning. Therefore, with the emphasis on earlier training in LLL skills within the learner continuum, studies identifying the influence of academic motivation on LLL, using SDT, are needed to elucidate LLL training needs and potential interventions to develop future “master learners”.

## **1.2 Conceptual frameworks**

### **1.2.1 Self-Determination Theory (SDT)**

SDT, initially developed by Deci and Ryan, is a well-studied theory for understanding motivation for learning (Deci et al. 1991, Deci, Ryan, and Williams 1996). According to SDT, motivation consists of a continuum ranging from amotivation to intrinsic motivation (IM) and individuals move through this continuum towards autonomous motivation by fulfilling three core needs: autonomy, competence, and relatedness (Ryan 1995, Ryan and Deci 2000). IM, defined as an individual’s pursuit of an activity as a result of personal interest and enjoyment, can be further sub-divided into the following domains: the motivation to know, to accomplish things and to

experience stimulation (Vallerand et al. 1992). In contrast, individuals pursuing activities based on extrinsic motivation (EM) are motivated by a separable outcome, such as a reward. EM can also be further divided into different levels of self-determination, specifically external regulation, introjected regulation, identified regulation and integrated regulation (Ryan and Deci 2000, Vallerand et al. 1992). Learners motivated by *external regulation* learn in response to external demands, such as the pressure or expectation of others. The next level of EM is *introjected regulation*, which is described as the level of regulation where the individual recognizes the importance of study, but studies to enhance self-esteem or sense of self-worth. In the third level of EM, called *identified regulation*, the learner identifies the importance of learning and has accepted the regulatory process. The last stage of EM is *integrated regulation*, where the learner has accepted the importance of study and the locus of causation is now fully internal or *intrinsic* and the externally motivated behavior now matches the learner's values and goals. This progression from amotivation to IM reflects increasing self-determination, which has been purported to stimulate LLL.



**Figure 1. Self-determination continuum (Ryan and Deci 2000)**

### **1.2.2 Hojat's Conceptualization of Lifelong learning**

Although there is no universally accepted definition of LLL, there have been attempts to operationalize the construct of LLL. Hojat and colleagues describe a comprehensive definition of LLL that encompasses four key concepts (Hojat et al. 2003, Hojat et al. 2006, Hojat, Veloski, and Gonnella 2009):

- Self-initiated activities (behavioral aspect)
- Information-seeking skills (capabilities)
- Sustained motivation to learn (motivation)
- Ability to identify one's own learning needs (cognition)

This multi-dimensional construct of LLL has also been the basis for development of the Jefferson Scale of Lifelong Learning (JSLL), a measure of LLL that has construct and criterion-

related validity evidence (Hojat et al. 2006, Hojat, Veloski, and Gonnella 2009, Murad and Varkey 2008) for measuring orientation to LLL.

The concept of LLL also overlaps with components of self-directed learning (SDL) previously described in the literature. A systematic review of SDL in health professions' literature resulted in identification of seven key components of SDL including: identification of learning needs and identification of appropriate resources, both of which correspond to several components of Hojat's LLL definition, including the cognition and capabilities domains, respectively (Murad and Varkey 2008) (Table 1). However, the role of motivation to learn remains a unique factor driving LLL in students and is not fully captured in many definitions of SDL in medical education.

**TABLE 1**

**COMPONENTS OF SELF-DIRECTED LEARNING**

**7 Key Components of Self-Directed Learning (Murad and Varkey 2008)**

1. The educator as a facilitator
2. Identification of learning needs
3. Development of learning objectives
4. Identification of appropriate resources
5. Implementation of process
6. Commitment to a learning contract
7. Evaluation of learning process

### **1.3 Review of the relevant literature**

Despite the role of academic motivation in LLL, there has been a paucity of studies exploring the relationship between academic motivation and LLL. One study of 3195 physician alumni from Jefferson Medical College examined the association between the JSLL and 13 survey questions assessing learning motivation (Hojat, Veloski, and Gonnella 2009). Results from this study showed significant correlations between JSLL scores and each of the 13 learning motivation domains, including a significant negative correlation with responses to two questions assessing EM. In a study involving medical students in their third term, Sobral et al. studied students' motivation to learn using the Academic Motivation Scale (AMS) and reported a significant positive correlation between autonomous (intrinsic) motivation and the following factors: reflection in learning, academic achievement, and intention to continue with studies (Sobral 2004). Therefore, these early findings suggest that academic motivation and more specifically, intrinsic motivation, could potentially increase orientation to LLL during medical training.

Despite the recognized role of motivation in LLL, few studies have used formal measures for assessing the relationship between LLL and academic motivation (Sobral 2004). The use of scales such as the JSLL and AMS, which have validity evidence, is likely to yield more rigorous data on LLL and motivation domains, respectively.

In addition to motivation, additional factors have been shown to influence LLL in health professions. Academic clinicians (defined as spending more time on research and teaching) and specialist physicians report significantly higher orientation to LLL on the JSLL compared to full-time clinicians and primary care physicians, respectively (Hojat et al. 2006, Hojat, Veloski, and Gonnella 2009). Moreover, data from medical students training in Pakistan showed that students

who participated in research projects had a higher tendency for SDL (Mahmud et al. 2014). Additional evidence has demonstrated that readiness for SDL is higher than the general population for health professionals at the start of training but declines over the course of health professions training (Premkumar et al. 2013, 2014).

Although factors influencing LLL in practicing physicians and medical students have been identified, it is unclear if the influence of these factors on LLL also impacts postgraduate trainees. One pediatric resident study examined LLL using the JSLL in a postgraduate medical education setting; however, this study did not compare differences in orientation to LLL based on residents' factors, such as level of training or research involvement (Li, Tancredi, et al. 2010). In addition, studies examining resident orientation to LLL, using scales, have not specifically examined residents' LLL practices, such as information seeking and self-reflection. Describing trainees' LLL practices may assist with contextualizing results related to LLL and academic motivation within specific training settings.

#### **1.4 Research question**

Given the limited literature in postgraduate medical education examining the relationship between LLL and academic motivation, our purpose was to study this relationship for residents in our psychiatry residency program. Our primary research questions were as follows:

- What components of academic motivation are associated with orientation to LLL in psychiatry residents?
- How does academic motivation and orientation to LLL differ based on psychiatry resident factors, such as level of training, age, or participation in research?

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

### **1.5 Hypothesis**

We hypothesized that intrinsic motivation would be positively correlated with orientation to learn on the JSLL and extrinsic motivation domains would be negatively correlated with JSLL scores. Based on previous studies in undergraduate and practice settings, we also hypothesized that JSLL scores would be lower for senior psychiatry residents and higher for residents participating in the research stream.



## **2. METHODS**

### **2.1 Setting**

The study setting was the University of Toronto, Department of Psychiatry, which is the largest psychiatry residency program in Canada. The department is comprised of 19 hospital sites, a total of 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 residents' postgraduate Year 2 (PGY2). Residents take a series of examinations starting in the latter part of their PGY4 training year. Early in their training, residents can apply to pursue a clinician-scientist stream, 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 introducing maintenance of certification is offered to PGY5 residents.

### **2.2 Participants**

At the time of this study, 173 psychiatry residents at the University of Toronto were eligible for the study. Twelve (12) of the 185 residents were on professional leave during the study period. Residents were eligible to participate if they were currently enrolled in the University of Toronto psychiatry residency program and assigned to a psychiatry residency rotation. Questionnaires were distributed after participants had an opportunity to review a study information sheet. Consent to participate was implied by completion of the questionnaire. Study design and participant participation is outlined in Figure 2.

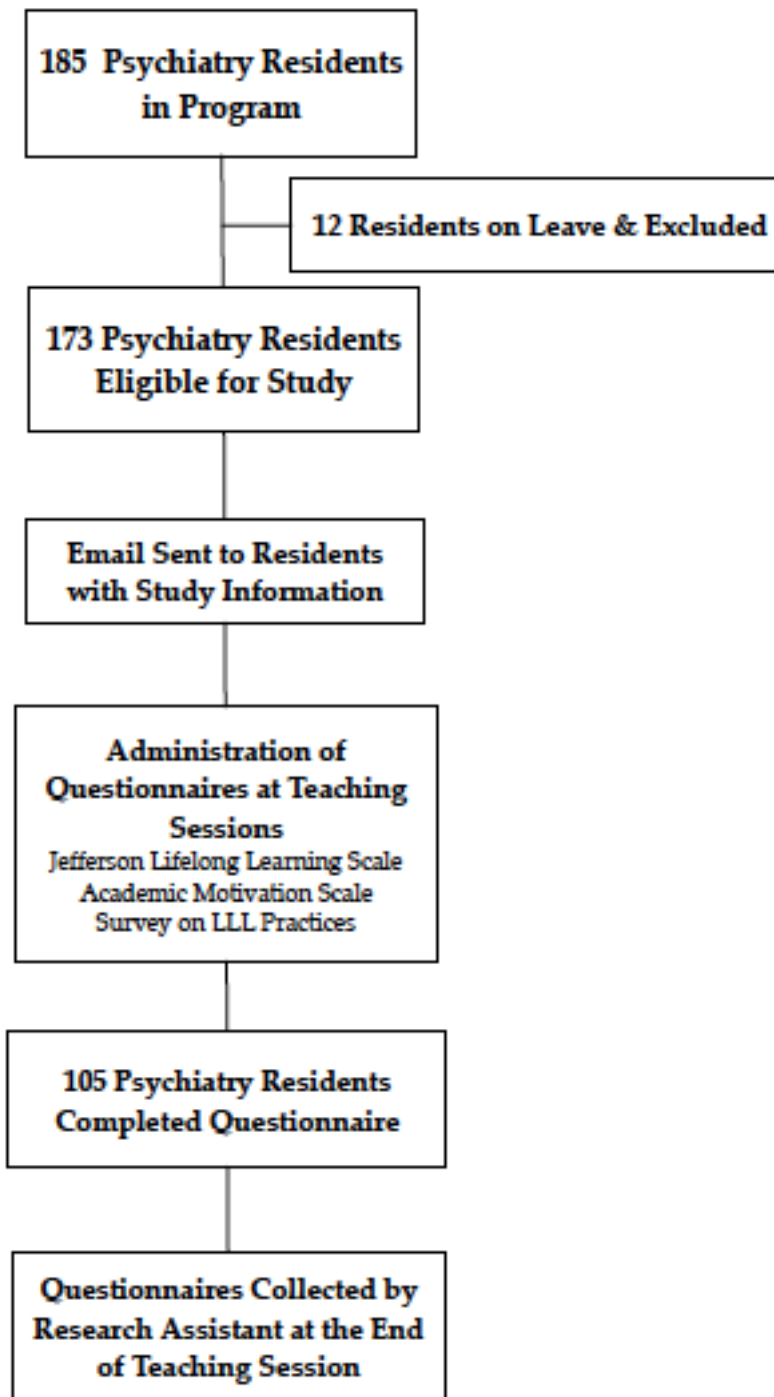


Figure 2. Study Design

### **2.3 Study Instruments**

We administered a study questionnaire to eligible participants, which consisted of three study instruments: a LLL needs assessment survey; trainees' orientation to lifelong learning; and trainees' academic motivation using a SDT framework.

Our LLL needs assessment survey was developed based on a review of existing LLL definitions (Albanese et al. 2009, Hojat et al. 2006, Hojat, Veloski, and Gonnella 2009) and previously described competency domains for continuing professional development (Campbell et al. 2010). Survey questions were developed in an iterative process based on feedback from psychiatry trainees and educators. The final needs assessment questionnaire consisted of 16 questions on participant demographics such as age (categorized by 5-year intervals until age 40 years in order to maintain anonymity), gender and training background; information seeking patterns and barriers; use of technology for self-directed learning; and motivation for learning (see Appendix 1). Question response options were either categorical or on a 5-point Likert scale. This section of the survey was piloted with 10 residents in the program prior to administering the survey to our entire psychiatry resident sample.

The second instrument used in our questionnaire was the Jefferson Scale of Lifelong Learning (JSLL), a 14-item tool assessing individuals' orientation to LLL (Hojat, Veloski, and Gonnella 2009, Wetzel et al. 2010). The 14-item JSLL was derived from the initial 19-item scale and scores for this shorter version range from 14 to 56. Each item on the JSLL is rated on a 4-point Likert scale, ranging from "strongly disagree" to "strongly agree". The scale reliability (Cronbach's alpha) was 0.77 to 0.86 based on previous studies (Hojat et al. 2003, Hojat et al. 2006, Hojat, Veloski, and Gonnella 2009).

We also assessed learner motivation using the Academic Motivation Scale (AMS) developed by Vallerand and colleagues (Vallerand et al. 1992, Vallerand et al. 1993). The AMS assesses motivation across the SDT continuum and measures motivation in three sub-domains: IM, EM, and amotivation. The AMS consists of 28-items and each item on the AMS explores the reasons why trainees are pursuing psychiatry residency training. The items on the AMS, originally designed for university students, were modified for our psychiatry resident sample. Individual items are scored on a 7-point Likert scale ranging from “not at all” to “exactly”. The AMS is divided into seven subscales of four items each: three sub-scales related to IM, three sub-scales related to EM, and one sub-scale related to amotivation. The three IM sub-scales include: IM to know (engaging in an activity for the pleasure of learning); IM to accomplish things (engaging in an activity for the pleasure experienced when attempting to accomplish something); and IM to experience stimulation (engaging in an activity in order to experience stimulating sensations) (Vallerand et al. 1992). The three EM sub-scales are external regulation (learning behavior regulated by external means and rewards); introjected regulation (individual begins to internalize reasons for behavior); and identification (internalization of extrinsic motives). In addition, the AMS generates an overall self-determination index (AMS-SDI) used to quantify student motivation.

## **2.4 Procedure**

PGY1 to PGY5 residents were recruited for the study from the University of Toronto, Department of Psychiatry six months into their respective training year (e.g., PGY1 residents completed six months of their first year). A recruitment email with the study consent form was sent via email through a central department email list and recruited psychiatry residents provided

implied consent to participate at a centralized teaching session. A research assistant distributed questionnaires at resident teaching sessions and completed questionnaires were collected at the conclusion of the session.

## **2.5 Data Analysis**

We entered and analyzed data using SPSS version 20.0. Means and standard deviations for continuous variables and percentages for categorical variables were reported. For the purpose of our analysis, we grouped residents in PGY1 to PGY2 and PGY3 to PGY5, into junior and senior resident categories, respectively. This decision was based on discussions with psychiatry educators and psychiatry residents, who both confirmed that residents were assuming more senior roles on teams and rotations starting in PGY3 after their foundational PGY2 general psychiatry training year.

We analyzed differences between junior and senior residents on the AMS and JSLL using student t-tests. Clinician-scientist (CSS) and non-clinician scientist (research) stream (non-CSS) residents were also compared across the JSLL and AMS score domains using t-tests. Differences in categorical variables between groups were conducted using chi square analyses. As a sub-analysis, we also conducted a one-way analysis of variance to compare mean scores on the JSLL and AMS-SDI for residents in each training year and each age category. Post hoc comparisons were conducted using a Tukey's test to compare differences in JSLL and AMS-SDI scores across training years. In addition, we used Pearson correlations to analyze the association between JSLL and AMS-SDI scores. Statistical significance was defined as  $p=0.05$ .

### **3. RESULTS**

#### **3.1 Demographics**

A total of 105 psychiatry residents participated in the study (response rate = 61%) and a majority were females (62%, n=65). The majority of participants were between the ages of 26 to 30 years old (66%) followed by 31 to 35 years old (26%). The distribution of resident respondents across training years was 19% (n=20) for PGY1's, 17 % (n=18) for PGY2's, 24% (n=25) for PGY3's, 19% (n=20) for PGY4 residents and 19% (n=20) for PGY5 residents. Residents in the program completed their medical degree from 15 different medical schools in Canada with the University of Toronto (16%) and McMaster University (16%) being the most common schools. Thirteen (12%) respondents graduated from international medical schools. Sixteen respondents (15%) were in the CSS (research) training stream and there was no significant difference in the proportion of junior (n=8) and senior psychiatry residents (n=8) who were in the CSS training stream at the time of the study (p=0.214). Two resident respondents did not indicate their training year or research stream status.

#### **3.2 Relationship Between JSLL and AMS Domains**

Respondents' mean scores were  $41.08 \pm 4.99$  for the JSLL and  $7.19 \pm 3.46$  for the AMS-SDI. Pearson correlations between JSLL scores and AMS domains are summarized in Table 2. JSLL scores were significantly correlated with AMS-SDI scores ( $r = 0.31$ ,  $p = 0.001$ ). With respect to IM domains, JSLL was significantly associated with IM to know ( $r = 0.46$ ,  $p < 0.001$ ), toward accomplishment ( $r = 0.35$ ,  $p < 0.001$ ) and to experience stimulation ( $r = 0.23$ ,  $p = 0.021$ ). For EM domains, only EM through external regulation was significantly negatively correlated

with JSLL scores ( $r = -0.20$ ,  $p = 0.047$ ). Amotivation was not significantly associated with JSLL scores.

Using the single questionnaire item assessing residents' self-rated motivation for self-directed learning, 70% of respondents indicated that they were highly motivated (defined as "very high" or "high" motivation on 5-point scale) for self-directed learning and there was no significant difference based on junior-senior resident status. JSLL scores were significantly higher in respondents classified as highly motivated for self-directed learning on this single item ( $42.2 \pm 4.3$  vs.  $38.4 \pm 5.7$ ,  $p < 0.001$ ). There was no significant difference on AMS-SDI scores for highly motivated residents as defined by this single item.

**TABLE 2**

**CORRELATIONS BETWEEN JSLL AND AMS-SDI DOMAINS**

<b>AMS Domain</b>	<b>JSLL (r)</b>	<b>p-value</b>
AMS Total (Self-Determination Index)	0.31	0.001
AMS Intrinsic Motivation		
To know	0.46	<0.001
Toward accomplishment	0.35	<0.001
To experience stimulation	0.23	0.021
AMS External Motivation		
External regulation	-0.20	0.047
Introjected	0.01	0.947
Identified	0.09	0.360
Amotivation	-0.029	0.774

### **3.3 Trainee Factors Influencing JSLL and AMS Scores**

There was no significant difference in total AMS-SDI and JSLL scores between junior and senior residents (Table 3). Analysis of AMS sub-domains showed that junior residents had a significantly higher score on the EM identified domain (Junior  $5.68 \pm 0.72$  vs. Senior  $5.30 \pm 1.00$ ,  $p=0.025$ ) compared to senior psychiatry residents. Senior residents' AMS external regulation scores were significantly higher than junior residents (Junior  $3.59 \pm 1.58$  vs. Senior  $3.63 \pm 1.29$ ,  $p=0.045$ ). There were no other significant differences between AMS domains.

**TABLE 3**

DIFFERENCES IN LIFELONG LEARNING AND ACADEMIC MOTIVATION BETWEEN JUNIOR AND SENIOR RESIDENTS

<b>Domain</b>	<b>Resident Group</b>		<b>p-value</b>
	<b>Junior Residents (n=38)</b>	<b>Senior Residents (n=65)</b>	
JSLL	$42.75 \pm 5.48$	$41.05 \pm 4.61$	0.135
AMS Total (Self-Determination Index)	$7.76 \pm 3.77$	$6.90 \pm 3.28$	0.230
AMS Intrinsic Motivation			
To know	$5.41 \pm 0.95$	$5.27 \pm 0.97$	0.506
Toward accomplishment	$4.29 \pm 1.20$	$4.23 \pm 1.31$	0.820
To experience stimulation	$4.11 \pm 1.23$	$3.70 \pm 1.37$	0.138
AMS External Motivation			
External regulation	$3.59 \pm 1.58$	$3.63 \pm 1.29$	0.045
Introjected	$3.50 \pm 1.43$	$3.40 \pm 1.58$	0.727
Identified	$5.68 \pm 0.72$	$5.30 \pm 1.00$	0.025
Amotivation	$1.79 \pm 0.91$	$1.84 \pm 1.10$	0.797



In addition, CSS residents had significantly higher JSLL scores compared to non-CSS residents ( $43.78 \pm 6.28$  vs.  $40.63 \pm 4.60$ ,  $p=0.020$ ) (Table 4). There were no significant differences between AMS total scores or the AMS IM, EM or amotivation domain scores.

**TABLE 4**

DIFFERENCES IN LIFELONG LEARNING AND ACADEMIC MOTIVATION BETWEEN  
CSS AND NON-CSS RESIDENTS

Domain	Resident Group		p-value
	CSS (n=16)	No CSS (n=87)	
JSLL	$43.78 \pm 6.28$	$40.63 \pm 4.60$	0.020
AMS Total (Self-Determination Index)	$7.24 \pm 3.58$	$7.18 \pm 3.48$	0.951
AMS Intrinsic Motivation			
To know	$5.63 \pm 0.75$	$5.27 \pm 0.98$	0.172
Toward accomplishment	$4.09 \pm 1.38$	$4.28 \pm 1.26$	0.595
To experience stimulation	$3.96 \pm 1.32$	$3.83 \pm 1.34$	0.723
AMS External Motivation			
External regulation	$3.32 \pm 1.90$	$3.68 \pm 1.26$	0.340
Introjected	$5.31 \pm 0.66$	$5.45 \pm 0.97$	0.210
Identified	$5.45 \pm 0.97$	$5.31 \pm 0.66$	0.592
Amotivation	$2.02 \pm 1.20$	$1.80 \pm 1.01$	0.446

Analysis for individual training years showed that PGY1 residents had significantly higher JSLL scores compared to PGY2 residents ( $43.98 \pm 5.02$  vs.  $38.07 \pm 4.76$ ,  $p=0.002$ ). No other significant differences between JSLL were identified amongst residents in the remaining training years. Moreover, there was no significant difference in AMS-SDI scores when comparing individual psychiatry residency training years. Lastly, JSLL and AMS-SDI scores did not significantly differ across age categories or by trainees' medical school.

### **3.4 Psychiatry Residents' Lifelong Learning Practices**

Table 5 summarizes responses to 5-point Likert scale questions exploring residents' information seeking practices and motivation for self-directed learning. Questionnaire data indicated that most residents reported reflecting on and assessing their individual learning needs "sometimes" (43%) or "often" (40%). Moreover, most respondents were "very" (32%) or "moderately" (51%) confident in their ability to problem solve if they encountered a clinical situation that they were not exposed to in their training. In instances where residents identified a need for further training in an area of practice, 84% of respondents felt very (34%) or moderately (50%) confident in their ability to pursue appropriate learning.

With respect to information seeking behavior as part of LLL, most respondents indicated that they use the internet (58%) followed by scholarly literature (33%), a discussion with a peer or colleague (32%) and use of a mentor (23%). Overall, 63% of 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 learning were their laptop (59%) and their mobile phone devices (33%); and the least often used were print copies of books or journals (5%) and their tablet (6%). With respect to preferred methods for self-directed learning online, respondents most preferred methods of directly accessing online journals (43%) and specialized websites on topics (41%) in comparison to online decision aides (17%) or online courses (5%).

**TABLE 5****RESIDENTS' PERCEIVED INFORMATION SEEKING PRACTICES AND BARRIERS**

<b>Item</b>	<b>Responses</b>				
	<b>Very Often/ Extremely</b>	<b>Often / Very</b>	<b>Sometimes / Moderately</b>	<b>Rarely / Slightly</b>	<b>Very Rarely / Not At All</b>
How often do you reflect on and assess your individual learning needs?	9%	40%	43%	7%	1%
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%	32%	51%	6%	1%
How confident do you feel about your ability to pursue the appropriate learning?	8%	34%	50%	6%	2%

## 4. DISCUSSION

### **4.1 Relationship of results to hypotheses**

As hypothesized, our results confirmed a significant correlation between JSLL and AMS-SDI scores, although this correlation was modest in strength. Furthermore, we demonstrated a significant correlation between JSLL and the three IM domains. JSLL had the strongest correlation with IM to know ( $r=0.46$ ) in comparison to IM toward accomplishment ( $r=0.35$ ) or IM to experience stimulation ( $r=0.23$ ). Contrary to our hypothesis, we did not observe a significant association between JSLL scores and either EM or amotivation scores.

With respect to resident factors, JSLL and AMS-SDI scores did not change with year of training and resident age. However, junior residents had significantly higher scores on the EM identified domain and senior residents had significantly higher scores on the EM external regulation domain. As hypothesized, residents in the residency program's research track showed significantly higher orientation to LLL but not higher academic motivation scores.

### **4.2 Relationship of results to previous studies**

It is important to note that mean JSLL scores for psychiatry residents in our sample ( $41.1 \pm 5.0$ ) were lower than scores reported in samples involving practicing clinicians ( $46.2 \pm 5.5$ ) (Hojat, Veloski, and Gonnella 2009), pediatric residents ( $43.0 \pm 4.8$ ) (Li, Tancredi, et al. 2010) and medical students ( $43.5 \pm 4.7$ ) (Wetzel et al. 2010). Furthermore, mean JSLL scores for research stream residents in our sample ( $43.78 \pm 6.28$ ) were comparable to pediatric resident and medical student JSLL scores. It is unclear if the lower total JSLL scores found in our sample were unique to psychiatry or the specific residency program. Nonetheless, residents' self-reported confidence in pursuing LLL was relatively high, with 84% of residents indicating that

they had moderate or higher confidence in their LLL skills. This finding is likely secondary to residents' poor ability to self-assess their strengths and weakness, a finding that has been well established in the literature (Davis et al. 2006, Gordon 1991, Hodges, Regehr, and Martin 2001).

Our results provide additional support for Schumacher et al.'s framework for developing "the master learner" and underscores the importance of self-determination theory for understanding the factors that foster lifelong learners (Schumacher, Englander, and Carraccio 2013). Sobral et al. demonstrated a significant association between IM and reflection in learning and intention to continue learning (Sobral 2004) in their study of medical students. Although controlled motivation (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 JSLL score and AMS EM scores.

Moreover, Hojat et al. also showed significant correlations between the JSLL and 13 survey questions related to learning motivation in practicing physicians (Hojat, Veloski, and Gonnella 2009). Their study also showed a negative correlation between JSLL and questions related to EM, which differed from our study and could be explained by our use of the AMS to assess motivation and our focus on trainees as distinguished from practicing physicians. Nonetheless, our findings further strengthen our understanding of the influence of IM and orientation to LLL during postgraduate training.

In our study, we observed significantly higher EM related to external regulation in senior residents. This finding is potentially a result of senior residents undergoing examinations and learning occurring in response to these pressures. We also reported higher EM identified scores for junior residents, which suggests that junior residents have consciously valued learning and

that motivation to learn is somewhat internal (Ryan and Deci 2000). Interestingly, PGY1 residents had higher scores on the JSLL compared to PGY2 residents, which suggests greater orientation to LLL early in the first year of psychiatry training. It is possible that this is a result of pre-existing orientations to LLL from medical school, which is reinforced by comparable JSLL scores seen in medical students (Wetzel et al. 2010). It is also possible that the PGY1 training year resembles the frequent rotation transitions and training experience of medical school and continues to train residents to be more self-regulated learners and thus, fostering greater orientation to LLL. This link has been reported in students learning in problem-based learning formats rather than “traditional” pedagogy (White 2007). Lastly, the difference between PGY1 and PGY2 residents on LLL could also be a product of specific teaching and training approaches used in the first six months of their second training year. Therefore, further study of this finding is needed to elucidate the reason for this early training difference in LLL.

Although we observed a decline in JSLL 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 decline in readiness for SDL over the course of medical school training (Premkumar et al. 2013). The same authors also replicated this finding for dentistry students (Premkumar et al. 2014). Differences between our study results and the studies by Premkumar and colleagues could be explained by differences in study measures (JSLL vs. Guglielmino’s SDL Readiness Scale) and in study methodology; in their studies they followed a portion of their trainees over time whereas our study was strictly cross-sectional. In addition, it is possible that postgraduate trainees may show fewer changes in JSLL over the course of training in comparison to health professions students with fewer training years.

### **4.3 Interpretation of results**

The results of our study reinforce the need to develop and maintain IM during residency training, given its salient role in increasing orientation to LLL. Consistent with SDT, IM is created from three physiological needs: autonomy, competence and relatedness. Orsini et al. conducted a systematic review exploring how IM can be encouraged in undergraduate students in clinical teaching environments (Orsini et al. 2015). In this review, the authors recommend supporting autonomy through identifying student learning needs, using different learning approaches, promoting active participation, and giving learners learning 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 et al. describe a similar process but use the concept of “scaffolding” (Biondi et al. 2015), which was initially described by Vygotsky, and involves supporting the learner through different stages of learning until the learner can perform the activity on their own (Vygotsky 1978). The development feedback-rich curricula where students receive greater formative and constructive feedback are likely to further enhance IM and orientation to LLL (Kusurkar 2012, Kusurkar et al. 2012).

Furthermore, Kusurkar and colleagues 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 (Kusurkar et al. 2012). Studies have also shown that academic clinicians have greater orientations to LLL than clinicians exclusively focused on patient care (Hojat, Veloski, and Gonnella 2009), which further supports the role of research training and experiences in cultivating LLL in residency training.

#### **4.4 Limitations**

The following limitations should be considered when interpreting our study results. First, our study was a cross sectional study and changes in JSLL and AMS scores across trainee sub-groups may have resulted from following the same cohort of residents longitudinally.

Second, although our response rate was over 60% for our study questionnaire, 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 (Premkumar et al. 2013, Hojat et al. 2006).

Third, the findings may be specific to psychiatry residents and our program at the University of Toronto. Nevertheless, the University of Toronto, Department of Psychiatry is a large multi-site institution with 19 training sites and provides a breadth of training contexts that could support the generalizability of findings to other programs and sites.

#### **4.5 Future Implications**

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 to LLL in trainees.

Furthermore, additional research on longitudinal changes in JSLL, and corresponding changes to IM across learner contexts, is needed to elucidate long-term trends in these domains. For example, cohort studies examining changes in LLL orientation and academic motivation in



learners across the continuum of undergraduate, graduate, and practice could provide insights into long-term trajectory. This “map” of LLL trends could 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.

## 5. CONCLUSION

In summary, this is the first study examining the relationship between academic motivation and orientation in a postgraduate setting. Our use of rigorous measures to study LLL and motivation confirmed prior research documenting the effect of IM on LLL for psychiatry residents. The results suggest that postgraduate curricula aimed at enhancing IM, for example through support for learning autonomously, can 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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## APPENDICES

### Appendix A – Survey on Lifelong Learning Practices

#### Needs Assessment Survey:

---

##### Demographics:

1. What is your gender?
  - Male
  - Female
  - Other? Please specify:
  - Prefer not to respond
2. What is your age range?
  - Under 20
  - 20-25
  - 26-30
  - 31-35
  - 36-40
  - 41 or over
  - Prefer not to respond

##### *For residents (#3-5):*

3. What Postgraduate year are you currently in?
  - PGY1
  - PGY2
  - PGY3
  - PGY4
  - PGY5
4. Which medical school did you receive your MD degree?
  - Dalhousie University
  - McGill University
  - McMaster University
  - Memorial University of Newfoundland
  - Northern Ontario School of Medicine
  - Queen's University
  - Universite de Montreal
  - Universite de Sherbrooke
  - Universite Laval
  - University of Alberta
  - University of British Columbia

- University of Calgary
  - University of Manitoba
  - University of Ottawa
  - University of Saskatchewan
  - University of Toronto
  - Western University
  - Other? Please specify:
5. Are you in the clinician scientist program or stream in your residency program?
- Yes
  - No

**Info seeking patterns/barriers:**

6. Do you feel that you have the right learning tools to succeed?
- Yes
  - No
  - Unsure
7. How often do you reflect on and assess your individual learning needs?
- Very often
  - Often
  - Sometimes
  - Rarely
  - Very rarely
  - Unsure
8. How confident are you in your ability to independently problem-solve if you encounter a clinical situation that you were not exposed to in your training?
- Extremely
  - Very
  - Moderately
  - Slightly
  - Not at all
9. If you identified an area of practice that required additional training, how confident do you feel about your ability to pursue the appropriate learning?
- Extremely
  - Very
  - Moderately
  - Slightly
  - Not at all
10. When you require additional information, where are you most likely to turn?  
Please select your *two best* options.

- The internet
- Peer/Colleague
- Mentor
- Scholarly literature
- Other? Please specify

**Educational technology use:**

11. What type of technology do you use most often for learning?

- Print copies of journals or books
- Personal Computer
- Laptop
- Tablet
- Mobile phone device

12. What is your preferred method of self-directed learning online

- Online decision aides
- Directly accessing the evidence on online journals
- Specialized web sites
- Online courses
- Other, please describe

**Motivation for learning:**

13. How would you characterize your motivation for self-directed learning?

- Very high
- High
- Unsure
- Low
- Very low

14. Lifelong learning (LLL) has been defined 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.” Do you agree with this definition of LLL?

- Yes
- No
- Unsure

15. Do you think there are gaps in this LLL definition (see definition in question #13)?

- Yes
  - i. Please describe:
- No
- Unsure



16. Have you received formal teaching about LLL during your residency training?

Yes

i. Please describe:

No

Unsure

## Appendix B – Jefferson Lifelong Learning Scale

Please consider the definition below before responding to the next set of questions.

Lifelong learning is 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* (Hojat et al., 2009).

### Modified Jefferson Scale of Physician Lifelong Learning

Please indicate the extent of your agreement with each of the following statements by circling the appropriate number.

	Strongly disagree	Disagree	Agree	Strongly Agree
1. Searching for the answer to a question is, in and by itself, rewarding	1	2	3	4
2. Lifelong learning is a professional responsibility of all physicians	1	2	3	4
3. I enjoy reading articles in which issues of my professional interest are discussed	1	2	3	4
4. I routinely attend annual meetings of professional medical organizations.	1	2	3	4
5. I read professional journals at least once every week	1	2	3	4
6. I routinely search computer databases to find out about new developments in my specialty	1	2	3	4
7. I believe that I would fall behind if I stopped learning about new developments in my profession	1	2	3	4
8. One of the important goals of medical school is to develop students' lifelong learning skills	1	2	3	4
9. Rapid changes in medical science require constant updating of knowledge and development of new professional skills	1	2	3	4
10. I always make time for self-directed learning, even when I have a busy practice schedule and other professional and family obligations	1	2	3	4

11. I recognize my need to constantly acquire new professional knowledge
12. I routinely attend continuing medical education programs to improve patient care
13. I take every opportunity to gain new knowledge/skills that are important to my profession
14. My preferred approach in finding an answer to a question is to search the appropriate computer databases

1	2	3	4
1	2	3	4
1	2	3	4
1	2	3	4

## Appendix C – Academic Motivation Scale

### The Academic Motivation Scale (AMS)

#### WHY DID YOU PURSUE A CAREER AS A PSYCHIATRIST?

*For each statement, use the scale to indicate why you are motivated to continue Psychiatry residency*

Does not correspond at all	2	3	4	5	6	7
1	2	3	4	5	6	7
<b>Corresponds a little</b>						
<b>Corresponds moderately</b>						
<b>Corresponds a lot</b>						
<b>Corresponds exactly</b>						

***WHY DO OR DID YOU PURSUE A PSYCHIATRY RESIDENCY?***

---

1. Because without an FRCPC degree, I would not find a high-paying job later on	1	2	3	4	5	6	7
2. Because I experience pleasure and satisfaction while learning new thing	1	2	3	4	5	6	7
3. Because I think that residency training will help me better prepare for the career (e.g. Psychiatrist) I have chosen	1	2	3	4	5	6	7
4. For the intense feelings I experience when I am communicating my own ideas to others.	1	2	3	4	5	6	7
5. Honestly, I don't know; I really feel that I am wasting my time in training.	1	2	3	4	5	6	7
6. For the pleasure I experience while surpassing myself in my studies.	1	2	3	4	5	6	7
7. To prove to myself that I am capable of completing my FRCPC degree.	1	2	3	4	5	6	7
8. In order to obtain a more prestigious job later on.	1	2	3	4	5	6	7
9. For the pleasure I experience when I discover new things never seen before.	1	2	3	4	5	6	7
10. Because eventually it will enable me to enter the job market in a field that I like.	1	2	3	4	5	6	7

11. For the pleasure that I experience when I read Psychiatry related books and authors .	1	2	3	4	5	6	7
12. I once had good reasons for going to residency; however, now I wonder whether I should continue.	1	2	3	4	5	6	7
13. For the pleasure that I experience while I am surpassing myself in one of my personal accomplishments.	1	2	3	4	5	6	7
14. Because of the fact that when I succeed in Psychiatry residency, I feel important.	1	2	3	4	5	6	7
15. Because I want to have "the good life" later on.	1	2	3	4	5	6	7
16. For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.	1	2	3	4	5	6	7
17. Because residency training will help me make a better choice regarding my career orientation (e.g. type of psychiatric practice in the future)	1	2	3	4	5	6	7
18. For the pleasure that I experience when I feel completely absorbed by what certain Psychiatry researchers/academics have written.	1	2	3	4	5	6	7
19. I can't see why I go through residency training and frankly, I couldn't care less.	1	2	3	4	5	6	7
20. For the satisfaction I feel when I am in the process of accomplishing difficult academic activities.	1	2	3	4	5	6	7
21. To show myself that I am an intelligent person.	1	2	3	4	5	6	7
22. In order to have a better salary later on.	1	2	3	4	5	6	7
23. Because my studies allow me to continue to learn about many things that interest me.	1	2	3	4	5	6	7
24. Because I believe that these additional years of Psychiatry residency will improve my competence as a mental health clinician .	1	2	3	4	5	6	7
25. For the "high" feeling that I experience while reading about various interesting subjects.	1	2	3	4	5	6	7
26. I don't know; I can't understand what I'm doing in residency training	1	2	3	4	5	6	7
27. Because residency training allows me to experience a personal satisfaction in my quest for excellence in my studies.	1	2	3	4	5	6	7
28. Because I want to show myself that I can succeed in my studies.	1	2	3	4	5	6	7

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