Relations between Psychological Needs Satisfaction, Motivation, and Self-Regulated Learning Strategies in Medical Residents

Fareeda Mukhtar

Department of Educational and Counselling Psychology

McGill University, Montreal

May 2014

A thesis submitted to McGill University in partial fulfillment of the requirements of the degree of Masters of Arts in Educational Psychology, Health Profession Stream.

Table of Contents

List of Tables

List of Figures

List of Appendices

Abstract

Residents in the medical field work to fulfil their clinical duties and study to pass exams at the same time. Thus, they need to continuously learn and acquire knowledge in a self-regulated manner that accommodates their busy work schedule. The importance of self-regulated learning (SRL) and its relation to motivation is widely recognised in educational literature, yet it is still not sufficiently explored in medical education literature. The current study was conducted to examine relations between residents' satisfaction of their psychological needs at work, their motivation to learn, and their reported use of different SRL strategies. A total of 160 residents from different medical departments at McGill University were asked to complete a questionnaire about their psychological needs satisfaction, motivation to learn, and use of SRL strategies. Path analysis showed that satisfaction of the perceived competence promotes more use of different SRL strategies through achieving intrinsic motivation. Results were discussed in terms of their impact on medical education practice as well as their theoretical implications.

Résumé

Les résidents en médecine veillent à s'acquitter de leurs tâches cliniques, tout en étudiant pour passer leurs examens. Ainsi, ils doivent continuellement apprendre et acquérir des connaissances de façon autorégulée, afin de respecter un horaire bien rempli. Bien que l'importance de l'apprentissage autorégulé et son rapport avec la motivation soient largement reconnus dans la littérature pédagogique, ils ne sont pas suffisamment explorés en médecine. Nous avons mené la présente étude en vue d'analyser les rapports entre la satisfaction des étudiants résidents et leurs besoins psychologiques au travail, leur motivation à apprendre et leur utilisation de diverses stratégies d'apprentissage autorégulé. Au total, nous avons demandé à 160 résidents de divers départements de médecine de l'Université McGill de remplir un questionnaire sur la satisfaction de leurs besoins psychologiques, leur motivation à apprendre et leur usage des stratégies d'apprentissage autorégulé. Selon notre analyse des pistes causales, la satisfaction des compétences perçues favoriserait l'usage de différentes stratégies d'apprentissage autorégulé, parce qu'elle crée une motivation intrinsèque. Nous discutons des résultats du point de vue de leur impact sur la pratique de l'éducation médicale, ainsi que sur leurs implications théoriques.

Acknowledgements

I would like to thank all the people who helped me through the different times of finalizing this thesis project.

First, I would like to express my gratitude to my supervisors, Dr. Krista Muis and Dr. Michelle Elizov, for their help and support from the beginning of this project and their trust that I would convert my research ideas into a well-designed research project. They continued to assist me with their expertise throughout the process of conducting my research and the final phases of writing my thesis. This work would not have been possible without their constructive feedback and support.

I also want to extend a special thanks to Dr. Linda Snell for her support and for being there when I needed her. Thank you also to Dr. Michael Hoover for his support and guidance during the statistical analysis. I would like to extend my gratitude to Anna Lee-Popham, Ms. Claire Kuhne, Alexie Doucet, and Carlos Gomez-Garibello. Thank you to all the programme directors, administrative staff, and participating residents in my study. Thank you to King Saud bin Abdulaziz University, the Ministry of National Guard, and the Saudi Arabian Cultural Bureau for their financial support.

I must thank my mother, Hanan, and my father, Hani, for their endless prayers and support, without which my achievements would not have been possible. Also I would like to thank my sister and brothers for their support. Thank you to my parents-in-law, Faisal and Lubna, for their support. A special thank you to the joy of my life, my little son, Faisooli.

Last but not least, the words “thank you” are insufficient to show my appreciation for the endless support and patience of my husband, Mohammed Shaheen. He has been there whenever I need help and always helps me handle the many difficult and stressful situations. Without him, I would not have been able to make it.

CHAPTER 1

Introduction

Medical professionals are required to remain current with the constantly expanding medical knowledge to maintain high-quality health care for their patients. It is well recognized that medical professionals need to learn continuously as part of their daily practice (Wiel, Bossche, Janssen, & Jossberger, 2011). That said, the knowledge of medical professionals has been shown to decline with time, potentially resulting in lower quality of care. One of the main explanations of this phenomenon is the lack of updated self-regulatory knowledge and new skills (Choudhry, Fletcher, & Soumerai, 2005). Thus, the importance of promoting self-regulated learning in medical practice is widely recognised. Self-regulated learning strategies are becoming progressively integrated within the framework of medical education as a central feature of medical professionals' development (Brydges & Butler, 2012). This integration also applies to the development of residents and practitioners (Duffy, 2008; Epstein, Siege, & Silberman, 2008; Holmboe et al., 2005; Mann, Gordon, & MacLeod, 2009; Wyatt & Sullivan, 2005). The primary purpose of this research is to examine the relationship between satisfying basic psychological needs, intrinsic motivation, and self-regulated learning strategies among medical residents. This issue will be approached following the conceptual framework of self-determination theory (Deci & Ryan, 2000).

What is self-regulated learning?

Self-regulated learning (SRL) refers to "learning that occurs largely from the influence of students' self-generated thoughts, feelings, strategies, and behaviours, which are oriented toward the attainment of goals" (p. viii) (Schunk & Zimmerman, 1998). Pintrich (2000) defines SRL as

"an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment" (p. 453). The process of SRL has been described by multiple theorists (e.g., Pintrich, 2000; Schunk & Zimmerman, 1998; Winne & Hadwin, 2008). Zimmerman (2000) describes the cycle of self-regulation in learning as consisting of three phases that are constantly iterated by the self-regulated learner. According to Zimmerman, the process starts with the forethought phase, wherein the learner sets his/her own learning goals and determines suitable learning strategies. This is followed by the performance phase, wherein the learner implements the pre-set plans from the previous phase, while constantly monitoring progress. The third phase of the cycle is the self-reflection phase, wherein the learner evaluates the strategy or strategies chosen and progress made, and then the cycle is repeated.

Theoretically, self-regulated learners are expected to more easily engage in the learning process, more effectively manage their metacognitive knowledge (i.e., awareness of one's own knowledge), and have more intrinsic motivation than learners who are less self-regulated (Zimmerman, 1990). However, SRL does not come automatically (Winne, 2005). Therefore, research about the conditions that facilitate SRL merits greater attention. As Brydges and Butler (2012) note, this is especially the case in the medical field, as medicine is a profession that is considered self-regulatory in nature. Medical students, residents, and practitioners are expected to regulate their learning processes throughout their career to ensure that standards of medical practice are met (Brydges & Butler, 2012). Unfortunately, there is little published evidence that medical schools and post-graduate institutions are successfully helping students and residents become effective self-regulated learners (White & Gruppen, 2010).

Medical schools and post-graduate institutions also expect medical students to spontaneously engage in SRL after graduation, as they go through their residency training, and in subsequent years of practice (White & Fantone, 2010). Schunk (2008) states that SRL is highly context-dependent; therefore, without setting the optimal conditions for residents to utilize their SRL abilities (e.g., posing questions in instances in which they are uncertain, engaging in critical thinking and reflection), residents and practitioners are not readily becoming efficient self-regulated learners (White & Gruppen, 2010; Wiel et al., 2011; Wyatt & Sullivan, 2005).

Residency and self-regulated learning

Residents represent a special group of health professionals. Since residents are transitioning from being medical students into becoming independent practitioners in various medical and surgical specialities, they carry a complex mixture of responsibilities. During this period, residents are responsible for actively contributing to the solution of patients' healthcare problems. At the same time, they are studying continuously to increase their knowledge, pass exams, and perfect their skills. Residents are challenged with time restrictions related to trying to balance their personal life, professional duties, and study (Duffy, 2008; Lacasse, Lee, Ghavam-Rassoul, & Batty, 2009). The heavy workload and the continuous learning responsibility required from residents reflect the complexity of their work/learning environment and the concurrent necessity for optimizing SRL (Ten Cate, Kusurkar, & Williams, 2011). The need to adopt self-regulated learning strategies among residents is essential given the links between continuous medical education and the quality of health care (Choudhry et al., 2005; Wiel et al., 2011).

Given the importance of SRL for residents, it is evident that research relevant to SRL in medical education is needed. It is, therefore, important to examine the extent to which medical

residents use SRL strategies as well as the factors that can potentially affect the use of these strategies. This will consequently help medical educators understand the extent to which SRL strategies are used by residents, such that they can ultimately try to develop effective strategies to help residents become efficient self-regulated learners who will pursue excellence throughout their professional careers. It is worth noting that SRL can be effectively modeled and enhanced (Pintrich, 1994; Schunk & Zimmerman, 1998). A key element to enhance SRL is the achievement of high levels of intrinsic motivation (Reeve, Ryan, Deci, & Jang, 2008).

Self-determination theory

Motivation is a complex phenomenon that encompasses many concepts and is described in the literature by multiple psychological theories. This complexity in describing motivation lies - at least partially - in the fact that motivation can either represent a process that leads to desired outcomes or represent a desirable outcome product by itself (Pintrich & Schunk, 2002; Winne & Marx, 1989; Wolters, 2010). Consequently, there are probably complex interdependent relationships between factors that affect, and are affected by, motivation (Grant, 2008; Guay, Boggiano, & Vallerand, 2001).

Deci and Ryan (2000) draw on self-determination theory (SDT) to describe and explain motivation. SDT represents a broad theory with multiple sub-theories that attempts to study human motivation. SDT has become a popular theory of motivation because of its application in different contexts, such as academic or work environments (Baard, Deci, & Ryan, 2004; Hagger, Chatzisarantin, & Harris, 2006; Ryan & Deci, 2002); across different cultures (Hayamizu, 1997; Jang, Reeve, Ryan, & Kim, 2009); and with persons of different ages and genders (Deci & Ryan, 2000; Ryan & Deci, 2002).

As explained in their framework, Deci and Ryan (2000) detail the dualistic view of intrinsic and extrinsic motivation on a continuum scale (Figure 1) that varies according to autonomy level (i.e., sense of control or choice). The far right-hand side of the continuum is the most autonomous degree of motivation, intrinsic motivation, and is defined as a person doing an activity for its inherent satisfaction rather than for external consequences. Extrinsic motivation represents a less autonomous degree of motivation and is defined as doing an activity to attain an external outcome, such as a reward, or to avoid a negative outcome, such as punishment. Within SDT, extrinsic motivation is classified into four types according to level of autonomy, namely external regulation, introjection, identification, and integration. Integration and identification are the most autonomous degrees of extrinsic motivation. Therefore, the term autonomous motivation represents intrinsic motivation, integration, and identification (Ryan & Deci, 2000b).

Figure 1

A Taxonomy of Human Motivation (adapted from Ryan & Deci, 2000a)

Regulatory Style	Amotivation	Extrinsic Motivation				Intrinsic Motivation
		External regulation	Introjection	Identification	Integration	
Perceived locus of causality	Impersonal	External	Somewhat external	Somewhat internal	Internal	Internal
		Least autonomous →				Most autonomous

Adapted with permission from Ryan, R. M., & Deci, E. L. (2000). Intrinsic and extrinsic motivation: Classic definitions and new directions. *Contemporary Educational Psychology,* 25, 61.

SDT also postulates that for the person to be intrinsically motivated and have a sense of self-determination, three innate and fundamental basic psychological needs must be satisfied, namely autonomy, competence, and relatedness. Ryan and Deci (2002) also state that these three basic psychological needs are complementary. Thus, the social context (e.g., work or academic environments) must satisfy all three psychological needs to reach the desired outcomes (e.g., the person will have higher levels of intrinsic motivation). Consequently, high levels of intrinsic motivation can act as a mediator between basic psychological needs leading to these better outcomes (Deci & Ryan, 2000; Guay, Boggiano, & Vallerand, 2001; Gagne & Deci, 2005). On the contrary, some recent publications suggest that intrinsic motivation moderates - rather than mediates - the relationship between the basic psychological needs and desired outcomes (e.g., work performance) (Dysvik & Kuvaas, 2011).

The SDT framework can help researchers understand practices that affect psychological needs satisfaction, positively or negatively, by observing both general outcomes (e.g., wellbeing) and specific behavioural outcomes (e.g., academic achievements). Moreover, the SDT framework can be readily used to implement supportive strategies in various environments to alter these outcomes. Empirical studies have shown that supporting the three basic psychosocial needs leads to achieving higher levels of motivation (i.e., intrinsic motivation) in both classroom and work environments (Baard et al., 2004; Jang et al., 2009). Some empirical studies, which will be discussed in the literature review section, have illustrated the positive influence of supporting autonomy and competence on the use of self-regulated learning strategies by students. These findings were believed to follow the conceptual framework of SDT; hence, these effects were attributed to a mediating effect on intrinsic motivation (Sierens, Vansteenkiste, Goossens, Soenens, & Dochy, 2009; Yamauchi & Tanaka, 1998). Typically, learners who use their self-

regulated learning strategies effectively tend to have higher levels of intrinsic motivation (Pintrich & DeGroot, 1990; White & Fantone, 2010).

Intrinsic motivation and SRL

High levels of intrinsic motivation have been shown to be positively associated with better learning, better academic performance and achievement, and higher levels of wellbeing in classrooms (Deci & Ryan, 2000; Ryan & Deci, 2000b; Vansteenkiste, Simons, Lens, Sheldon, & Deci, 2004). Higher levels of intrinsic motivation have also been associated with better clinical performance for medical students (Sandars & Cleary, 2011). The relationship between intrinsic motivation and SRL has been demonstrated in multiple empirical studies. For instance, Williams and Deci (1996) conducted a study on classroom environments and found that when autonomy support is provided by parents and teachers, students are better able to internalize their motivation and become more effective self-regulated learners. Reeve et al. (2008) reviewed several empirical studies and concluded many benefits that were attributed to autonomy-supportive classroom environments. Among those benefits, they identified that autonomy-supportive classroom environments help students set their own learning goals and regulate their learning behaviours. Kusurkar et al. (2012) linked motivation with the use of self-regulated learning strategies in the medical academic environment. They concluded that intrinsic motivation positively affects academic performance through the use of deep learning strategies (e.g., elaboration, organization, and critical thinking) and intensive study effort.

A few studies have examined intrinsic motivation and SRL in medical residents. Wiel et al. (2011) described the use of SRL among residents as disappointing and sub-optimal. Besides their busy schedules, a lack of intrinsic motivation has been described as a primary reason for these results (Lacasse, Lee, Ghavam-Rassoul, & Batty, 2009; Wiel et al., 2011). Residents were

found to be externally motivated by their patients and by trying to provide high-quality patient care, but this motivation was not sufficient to drive them to be efficient self-regulated learners. Wiel et al. (2011) suggested that strategies encouraging residents to be internally motivated by competence-improvement goals would potentially enhance their use of SRL and eventually improve overall patient care. The importance of strategies that support intrinsic motivation to enhance SRL in residents is becoming recognized in the literature. Kusurkar, Croiset, and Ten Cate (2011) have suggested different strategies to enhance intrinsic motivation, including providing a suitable autonomy-supportive environment to augment residents' intrinsic motivation. On the other hand, it is not surprising that feelings of stress and burnout are not uncommon among residents, which is possibly explained by a low sense of autonomy and a low level of intrinsic motivation (Dyrbye, Thomas, & Shanafelt, 2005; Geurts, Rutte, & Peeters, 1999).

There is scant literature, to our knowledge, that directly situates self-determination theory within SRL for medical residents. For example, the perception of autonomy and competence for clinicians is thought to reflect positively on their SRL behaviours (Hoffman & Donaldson, 2004; Sandars & Cleary, 2011; Brydges & Butler, 2012). Additionally, Stok-Koch, Bolhuis, and Koopmans (2007) suggest that feelings of relatedness can help residents focus on their learning process. Interestingly, multiple empirical studies have suggested that satisfying autonomy can lead to satisfying all three psychological needs (Deci, Koestner, & Ryan, 2001; Jang et al., 2009; Vallerand, Fortier, & Guay, 1997; Williams, McGregor, Zeldman, Freedman, & Deci, 2004).

The research problem

Based on the current literature, we can identify various links between SRL, autonomous motivation, and basic psychological needs satisfaction (as described by SDT). Although SRL is

an essential part of the residents' daily routine, it has not been extensively studied. In the absence of empirical studies, the literature on medical residents' SRL in clinical practice is dominated by theoretical assumptions. Hence, this topic represents a gap in the literature; further studies are needed that would aid in understanding the use of SRL strategies by residents as well as how such strategies can be encouraged.

Potential links between the three basic psychological needs and SRL are presented in the literature. Some of those links are mediated by intrinsic motivation. In this study, we will explore the relationship between residents' perceived satisfaction of the three psychological needs, their self-reported level of intrinsic motivation, and their self-reported use of SRL strategies. Prior to delineating specific hypotheses, we first review each of the theoretical frameworks and detail relevant studies. We end with our specific research questions and hypotheses.

Theoretical Frameworks

Self-Regulated Learning

Self-regulated learning is an area that has gained attention from educational psychologists over the last few decades. Although there are several theoretical frameworks that vary in their conceptualizations and assumptions underlying SRL, in general, SRL is concerned with how students master their mental abilities and efforts to reach specific academic goals or outcomes (Zimmerman, 2008). One of the key features of SRL is a learner's ability to initiate engagement in the learning task, choose and perform a suitable learning strategy, and show adaptation skills accordingly to achieve the required task (Zimmerman, 2008). Rather than present all theoretical frameworks, we present here two of the most prominent frameworks.

Self-regulated learning from a social cognitive perspective. According to Bandura (1986), human behavior is a result of dynamic interactions between social, behavioral, and

environmental factors. Based on this notion of dynamic interactions between these three factors, Zimmerman (2000) developed a model of self-regulation that defines SRL as learning that results from "self-generated thoughts, feelings, and actions that are planned and cyclically adapted to the attainment of personal goals" (p. 14). Zimmerman (1995) argues that self-regulation depends on personal beliefs and affects that are context specific, but reports that metacognition plays an important role.

According to Zimmerman (2000), self-regulation in learning is cyclical in nature and consists of three phases that occur in a feedback loop. Feedback from one phase will affect the learner's performance in the next phase. Zimmerman also proposed that adaptation to changes is a key factor in the process of self-regulation. During SRL, personal, behavioral, and environmental adaptation may occur. Personal adaptation involves an adjustment of personal affective and cognitive processes. Behavioral adaptation involves an adjustment of strategies used by the person. Environmental adaptation involves the adjustment needed according to the environmental conditions and outcomes. Zimmerman assumes that these three adjustments are open-ended and can be proactively altered by the learner depending on the goal value of the task. For instance, the person will proactively adjust or correct his/her performance according to the goal value he/she wants to achieve. The quality of adjustments of these three factors will influence the effectiveness and overall quality of SRL strategies.

Schunk and Zimmerman (1998) further detailed the cycle of self-regulation in learning as involving three phases: (1) the forethought phase; (2) the performance or volitional control phase; and (3) the self-reflection phase (Table 1). The forethought phase refers to the processes that precede and influence the performance of SRL strategies. The two key factors of the forethought phase are task analysis and self-motivational beliefs. Task analysis involves

specifying outcomes, goal setting, and strategic planning (Weinstein & Mayer, 1986). Self-motivational beliefs are necessary for the person to use his/her self-regulatory skills. Self-motivational beliefs include self-efficacy, outcome expectations, intrinsic interest, and goal orientation (Zimmerman, 2000). Bandura (1997) defined self-efficacy as personal beliefs about having the means to learn or perform effectively, whereas outcome expectations refer to beliefs about the ultimate ends of performance. Empirical studies have shown that self-efficacy beliefs relate to the use of SRL processes, such as the use of learning strategies in academic settings (Schunk & Schwartz, 1993; Zimmerman, Bandura, & Martines-Pons, 1992). In summary, the forethought phase is a proactive process whereby the learner prepares for the learning task by understanding the nature of the activity and creating an appropriate plan to carry out the task. It should be noted that the learner's motivational beliefs (i.e., self-efficacy, task value, and goal orientation) play an important role in helping the learner engage in the learning process.

Zimmerman (2000) describes the second phase of the cycle as the performance or volitional control phase during the learning task. This phase involves two processes: self-control and self-observation. Self-control helps the person to focus on the task and optimize his/her effort. Self-control processes include self-instruction, imagery or forming mental pictures, attention focusing, and task strategies. Self-observation refers to a person's tracking of specific aspects of his/her own performance, the surrounding conditions, and the effects and outcomes of that performance (Zimmerman & Paulsen, 1995). Self-observation includes several strategies, such as self-feedback, self-recording, and self-experimentation. Self-observation involves observation of emotional reactions as well as performance actions (Zimmerman, 2000).

In the self-reflection phase, the learner assesses whether or not his/her goals have been attained and whether the strategies used helped to achieve his/her goals. The self-reflection phase

involves both self-judgment and self-reactions. Self-judgment involves the self-evaluation of actions and outcomes as compared to standards or goals, or as compared to the person's previous performance on similar tasks. The self-evaluation process includes self-satisfaction and adaptive/defensive strategies. The quality of self-evaluation depends on the difficulty of the task and personal expertise (Zimmerman, 2000). Both self-judgment and self-reactions are intended to improve learners' reaction to their performance and outcomes. In addition, the self-reflection phase will subsequently influence the forethought phase for future tasks, thus completing the self-regulatory cycle (Schunk & Zimmerman, 2008).

Table 1

Phase Structure and Sub-processes of Self-Regulation (Zimmerman, 2000)

Cyclical self-regulatory phases		
Forethought	Performance/volitional control	Self-reflection
Task analysis	Self-control	Self-judgment
Goal setting	Self-instruction	Self-evaluation
Strategic planning	Imagery	Causal attribution
	Attention focusing	
	Task strategies	
Self-motivational beliefs	Self-observation	Self-reaction
Self-efficacy	Self-recording	Self-satisfaction/ affect
Outcome expectations	Self-experimentation	Adaptive defensive
Intrinsic interest/value		
Goal orientation		

Adapted with permission from *Handbook of Self-Regulation* (p. 16) by M. Boekaerts, P. R. Pintrich, & M. Zeidner, 2000, San Diego: Academic Press. Copyright [2000] by Academic Press.

Sociocultural influence of self-regulated learning. Zimmerman's (2004) social cognitive model of academic self-regulation is differentiated from other theories of SRL through its emphasis on social, environmental, and self-influence dimensions. Several factors that contribute to the difference between students in their use of SRL strategies have been identified, which include but are not limited to the nature of the task and students' gender, political preference, religious affiliations, and intellectual characteristics (Zimmerman, 2004).

The social-cognitive model of SRL views the social and physical environments as a potent resource for enhancing the three phases of SRL, namely, the forethought phase, the performance of volitional control phase, and the self-reflection phase. Zimmerman (2000) postulated that if the person neglects the environmental influence on his/her actions or views him/herself as an obstacle for personal development, this will be negatively reflected on the use of SRL strategies. On the other hand, people who use environmental supports, such as rewards or praise, may increase the use of their SRL reactions (e.g., reflection, self-evaluation).

From the social-cognitive perspective, several negative impacts have been reported in instances when a person fails to self-regulate his/her actions. For example, in academic settings, students who have difficulties in regulating their academic strategies report poor achievement in school (Zimmerman & Martinez-Pons, 1986, 1988) and have more problems with their teachers (Brody, Stoneman, & Flor, 1996). Zimmerman (1998) proposed that failure to use SRL strategies is mainly due to ineffective forethought and performance phases.

Pintrich's general framework of self-regulated learning. In contrast to Zimmerman's (2000) theoretical framework, Pintrich (1999, 2000) developed an SRL framework by drawing

on different self-regulation theories that view self-regulation from different assumptions and conceptualizations (Puustinen & Pulkkinen, 2001). Pintrich (2000) defined SRL as "an active, constructive process whereby learners set goals for their learning and then attempt to monitor, regulate, and control their cognition, motivation, and behavior, guided and constrained by their goals and the contextual features in the environment" (p.453). Pintrich developed this definition based on four common assumptions held by different models of SRL. The first is the active, constructive assumption that views learners as active, constructive participants (as is done by all SRL models). The second is the potential for control assumption, which outlines that learners have the ability to control and regulate their cognition, motivation, behaviours, and some features of their environment. The third is the goal, criteria, or standard assumption, which outlines that there are standards or criteria against which comparisons are made to assess learners' performance. The fourth assumption is that the activity or actions of the learners are mediators between learners' characteristics (e.g., personality traits, cultural background, and demographics) and their actual achievements or performance.

Pintrich's (2000) framework of SRL is presented in Table 2, which details different regulatory styles within each phase of SRL. SRL, as described by Pintrich, has four different phases: (1) forethought, planning, and activation phase; (2) monitoring phase; (3) control phase; and (4) reaction and reflection phase. Each phase includes four separate areas of SRL activities, which are (1) cognition; (2) motivation and affect; (3) behavior; and (4) context. However, Pintrich does not assume that these four phases are hierarchical (i.e., earlier phases must precede later ones), rather he recognizes that they can occur simultaneously (i.e., monitoring, control, and reaction can occur dynamically at the same time). The framework is presented as heuristic, as not all academic learning requires explicit self-regulation (Puustinen & Pulkkinen, 2001).

Table 2

Phases and Areas of Self-Regulated Learning (Pintrich, 2000)

Phases	Areas for regulation			
	Cognition	Motivation/affect	Behavior	Context
1. Forethought, planning, and activation	Target goal setting	Goal orientation adoption	[Time and effort planning]	[Perceptions of task]
	Prior content knowledge activation	Efficacy judgments	[Planning for self-observations of behavior]	[Perceptions of context]
	Metacognitive knowledge activation	Ease of learning judgements (EOLs); perceptions of task difficulty		
		Task value activation		
		Interest activation		
2. Monitoring	Metacognitive awareness and monitoring of cognition (FOKs, JOLs)	Awareness and monitoring of motivation and affect	Awareness and monitoring of effort, time use, need for help	Monitoring changing task and context conditions
			Self-observation of behavior	
3. Control	Selection and adaptation of cognitive strategies for learning, thinking	Selection and adaptation of strategies for managing motivation and affect	Increase/decrease effort	Change or renegotiate task
			Persist, give up	Change or leave context
			Help-seeking behavior	
4. Reaction and reflection	Cognitive judgments	Affective reactions	Choice behavior	Evaluation of task
	Attributions	Attributions		Evaluation of context

Adapted with permission from *Handbook of Self-Regulation* (p. 454), by M. Boekaerts, P. R. Pintrich, & M. Zeidner, 2000, San Diego: Academic Press. Copyright [2000] by Academic Press.

Pintrich (1999) classified SRL strategies into three categories: (1) cognitive learning strategies; (2) self-regulatory strategies to control cognition (metacognitive); and (3) resource management strategies. Cognitive learning strategies are numerous, and include rehearsal, elaborating, organizing, summarizing, and paraphrasing the learning materials. The complexity of these cognitive strategies ranges from simple memory tasks to more complex comprehensions, and range from more shallow processing (e.g., rehearsal) to deeper processing (e.g., critical thinking, elaboration) (Weinstein & Mayer, 1986). Rehearsal strategies include underlining important ideas/terms in the text, reading the words out loud, and reciting items (Pintrich, 1999). Elaboration involves an active process of arranging ideas and making connections between them, for example, summarizing and paraphrasing (Pintrich, 1999). Organizational strategies involve deeper cognitive strategies whereby the student uses multiple techniques to highlight and organize the ideas presented in the text, for example, by drawing a concept map (Pintrich, 1999). Studies have shown that a deeper understanding of a text is enabled through organizational strategies as opposed to rehearsal strategies (Kitsantas, Winsler, & Huie, 2008; Weinstein & Mayer, 1986). Finally, metacognitive strategies include planning, monitoring, and regulating. Metacognition was first defined by Flavell (1976) as the person's knowledge of his/her own cognitive processes and how he/she regulates those processes. More recent research on metacognition includes the use of higher order thinking, reasoning, and learning skills during learning, which lead to active control over cognitive processes and emotions (McCombs, 2008).

Pintrich (1999) proposed that both cognitive and metacognitive strategies have important effects on students' academic achievement. Metacognition involves two aspects: (1) knowledge about cognition and (2) regulation of one's own cognition (Brown, Bransford, Ferrara, & Campione, 1983; Flavell, 1979). Metacognitive knowledge is limited to a student's knowledge

about his/her own thinking, cognition, and strategies used, whereas self-regulation of cognition occurs when the student plans, monitors, and regulates his/her own cognition and behavior (Pintrich, Wolters, & Baxter, 1999). Planning activities help students to activate prior knowledge about the subject and decide which cognitive strategies are to be used (e.g., skimming through the reading, asking him/herself questions before reading [Pintrich, 1999]). Monitoring of activities occurs when the student compares him/herself against standards or their own previous effort and achievements. Monitoring includes activities such as the student checking his/her own understanding by asking questions of themselves or tracking his/her own attention level (Pintrich, 1999). Regulation strategies imply the actual use of strategies/behaviours to reach the desired goal after the process of monitoring and assessment (Pintrich, 1999).

Finally, resource management strategies include strategies used by the student to monitor and control his/her own environment and help achieve the desired goal (Pintrich, 1999). This includes choosing a proper study environment, time management, effort management, and help seeking (Garcia & Pintrich, 1996).

Within Pintrich's (1999) framework of SRL, motivation has an important role in initiating, sustaining, and facilitating the use of SRL strategies. Pintrich has conducted multiple empirical studies on school and college students to correlate motivational beliefs (self-efficacy, task value, and goal orientation) with SRL strategies. He concluded that self-efficacy beliefs and task value beliefs are positively correlated with the use of SRL strategies. He also examined the relationship between SRL and goal orientations of motivation. Pintrich focused his work on three types of goals (i.e., mastery, extrinsic, and relative ability). Pintrich concluded that students who adapt mastery goals will be more likely to use SRL strategies compared to those who adapt

extrinsic or relative ability goals. In the following section, we delineate relevant motivational frameworks.

Motivation

Motivation is a complex phenomenon that encompasses many concepts and is described in the literature by multiple psychological theories. Motivation drives people to act and complete required tasks. People have different *levels* (i.e., how much motivation) and different *orientations* of motivation (i.e., why they are they motivated to complete the task, what their goals entail) (Ryan & Deci, 2000a). SDT offers a robust theoretical framework to study motivation. Numerous empirical studies have used its framework on different populations, age groups, and environments. Additionally, the social-contextual orientation of SDT makes it an appropriate theoretical framework to use for our populations given the rich social context surrounding medical residents' environment. Hence, the motivational theory adopted for this thesis is self-determination theory, which is described in the following section.

Self-determination theory. Self-determination theory (SDT) was developed by Deci and Ryan in the 1970s and continues to grow today. Several studies have applied self-determination theory in different contexts (e.g., academic environments, work environments, and special education) (Baard et al., 2004; Hagger et al., 2006; Ryan & Deci, 2002;), with different ages and genders (Ryan & Deci, 2000a, 2002), and in different cultures (Hayamizu, 1997; Jang et al., 2009). This fact makes SDT a strong candidate for application in medical contexts.

SDT is concerned with why people engage themselves in certain activities and specifically whether they are satisfying a personal interest or complying with external/controlling factors. From this perspective, Deci and Ryan (2000) differentiate between autonomous motivation and controlled motivation. Autonomous motivation reflects a personal interest to

perform the task, while controlled motivation reflects a situation where the person is doing the task under the control of an outside force rather than based on personal interest. The extrinsic controlling force usually originates from the surrounding social environment (Reeve et al., 2008).

Deci and Ryan (2000) detailed the dualistic view of intrinsic and extrinsic motivation along a continuum (Figure 1) that varies according to autonomy level (i.e., sense of control or choice). The far right-hand side of the continuum is the most autonomous degree, which is called intrinsic motivation and is defined as a person doing an activity for its inherent satisfaction rather than for external consequences. That is, intrinsically motivated persons do the required task for enjoyment or challenge rather than because of external pressure or reward. Going to the left-hand side of this continuum (Figure 1), the locus of motivation becomes more extrinsic (i.e., more controlled by external factors). In real life, people are not always internally motivated to finish required tasks. Some other external factors lead them to do the task, hence the recognition of extrinsic motivation (Deci & Ryan, 2000; Ryan & Deci, 2002). Extrinsically motivated persons perform the required tasks for external outcomes (e.g. attain a reward or avoid punishment).

Self-determination theorists have proposed that extrinsic motivation can vary greatly in the degree to which it is autonomous. The degrees of extrinsic motivation are best described in a subtheory called Organismic Integration Theory (OIT) (Deci & Ryan, 1985; Ryan & Deci, 2000a, 2002). Within OIT, four degrees of extrinsic motivation are defined, namely: (a) external regulation; (b) introjection; (c) identification; and (d) integration. The least autonomous degree of extrinsic motivation is external regulation, which means that the task is performed to satisfy an external demand or attain a reward. The second degree of extrinsic motivation is introjection,

which describes a type of internal regulation that is still controlled by an external cause, such as feeling pressure to avoid guilt or anxiety. Although guilt is an internal feeling, introjected behaviours are not experienced as fully part of the self. The third degree of extrinsic motivation is identification, which is more autonomous and self-determined than the first two degrees. Identification is best described when a person realizes the importance of the task and accepts its regulation as his/her own. The fourth degree of extrinsic motivation is the most autonomous and is called integrated regulation. Integration occurs when identified regulation has been fully assimilated into the self. Integration shares many qualities of intrinsic motivation, yet it is considered as a degree of extrinsic motivation because the person does not reach the level of autonomy and does not fully enjoy the task without an external factor (Ryan & Deci, 2000a).

The far left-hand side of Ryan and Deci's (2000a) continuum describes a status called *amotivation* (lack of motivation), which occurs when a person lacks motives to perform a task. A person may lack motivation because he/she does not value the task (Ryan, 1995), does not feel competent to do it (Deci, 1975), or does not feel that it has any desirable outcomes (Seligman, 1975).

Basic psychological needs. Deci and Ryan (2000) proposed that for a person to be motivated, he/she needs to have a sense of control over the surrounding environment (autonomy) and be in charge of his/her behavior (i.e., be self-determined). A sense of self-determination occurs when the three innate and fundamental basic psychological needs are satisfied, namely, autonomy, competence, and relatedness. Autonomy reflects an individual's desire to be a causal agent in his or her environment and have a sense of ownership over his or her own actions. Autonomy is not affected by requesting help from others as long as the individual has the sense of free will in their performed actions. Competence is the perception of success and control of

the outcomes upon performing certain tasks or behaviours (Hagger et al., 2006). Competence does not only imply that the person can perform the task, but additionally he/she can perform it with confidence and effectiveness (Ten Cate et al., 2011). Competence includes beliefs about a person's own abilities that are similar to those outlined in self-efficacy theory (Greene & Azevedo, 2007). Relatedness is the innate desire to be supported by others and supportive of others when performing certain tasks or behaviours (Hagger et al., 2006).

Deci and Ryan (2002) also state that these three basic psychological needs are thought to be complementary to each other. Therefore, the social context, work, or academic environment must satisfy all three psychological needs to reach the desired outcomes (i.e., internalize motivation as described in Organismic Integration Theory). Deci and Ryan (2000) postulate that even if the environment does not satisfy these basic psychological needs, the person will typically increase his/her effort to satisfy them. For example, food is a basic nutrient for human beings to live; when a person is hungry, he/she will search for sources to satisfy that hunger. Similarly, the basic psychological needs are essential for psychological health. When these basic needs are not satisfied, the person will try to focus his effort to satisfy them (e.g., engaging in some defensive strategies).

In order for a person to be self-determined and self-regulating in his/her behavior, he/she must feel a sense of autonomy. One of the strategies that can be taken to satisfy autonomy is called internalization. The process of internalization is an active process whereby a person transforms an externally controlling regulation of values into an internally endorsed value or interest (Reeve et al., 2008). When the process of internalization becomes fully assimilated with one's sense of self in a coherent way, then it is called an integration process (Deci & Ryan, 2000; Ryan & Deci, 2000a, 2002). The people present in the environment (e.g., parents, teachers,

peers) can assist the person in the process of internalizing his/her motivation by providing autonomy support.

Ten Cate et al. (2011) argued that satisfying the need of autonomy implies satisfying the need of relatedness. Jang et al. (2009) argued that if the environment satisfies the need of autonomy, this will lead to the satisfaction of all three psychological needs: autonomy, competence, and relatedness. This idea was supported by several empirical studies (Deci et al., 2001; Vallerand et al., 1997; Williams et al., 2004). Moreover, basic psychological needs satisfaction has been positively associated with life satisfaction (Mayer, Enstrom, Harstvein, Bowles, & Beevers, 2007), well-being (Milyavskaya & Koestner, 2011; Reis, Sheldon, Gable, Roscoe, & Ryan, 2000), self-esteem (Thogersen-Ntouman & Ntoumanis, 2007); and negatively associated with depression (Wei, Philip, Shaffer, Young, & Zakalik, 2005) and anxiety (Deci et al., 2001).

In the educational context, Reeve (2002) emphasized the importance of supporting autonomy in teaching environments as this significantly affects students' perception of competence. Reeve and his colleagues (Jang et al., 2009) conducted an empirical study to determine relations between basic psychological needs satisfaction and several academic outcomes. They concluded that basic psychological needs satisfaction is positively associated with students' engagement, academic achievement, and intrinsic motivation, and negatively associated with students' feeling of negative affect.

Relationship between motivation and self-regulated learning

Motivation and SRL are related; as stated by Winne and Hadwin (2008) "without motivation, except for reflexive behavior like the eye blink reflex, there is no behavior, including SRL" (p. 297). According to SDT and its organismic integration sub-theory, all students have

inner motivational resources, which act as a starting point that helps them engage in learning activities, regardless of their background or abilities. The social environment may support or undermine these motivational resources (i.e., by providing or withholding autonomy support) (Reeve et al., 2008). It is evident that an autonomy-supportive environment helps students to set their own learning goals, regulate their learning behaviours, choose their own methods to solve problems, achieve their own goals and values, persist in the face of challenges, use more mature coping strategies, and have more positive emotions about their learning process (Reeve et al., 2008). Additionally, Reeve, Deci and Ryan (2004) state that in educational settings, basic psychological needs satisfaction is positively associated, in a predictable manner, with higher levels of intrinsic motivation and more use of SRL.

Despite the large amount of literature that has examined relations between these constructs in the educational context, few studies have been conducted to examine motivation and SRL in medical residents. Lack of intrinsic motivation has been considered to be a precursor of sub-optimal SRL among medical residents (Wiel et al., 2011). Therefore, strategies to foster intrinsic motivation in medical residents have been suggested by Wiel et al. (2011) in the goal of improving SRL and, subsequently, patient care.

Review of Empirical Studies

We conducted a search for related empirical studies in the medical field concerning SDT and SRL. The following search words were used when searching through two online data bases, PsycINFO and ERIC: “self-regulated learning and medical students,” “self-regulated learning and medical residents,” “basic psychological needs and medical students,” “basic psychological needs and medical residents,” “SDT and medical students,” and “SDT and medical residents.” The following limits were applied to the search: human, English language, and dates between

2000-2013 to ensure a recent review of relevant literature. The total number of search results was 125. All abstracts were scanned and relevant empirical studies conducted to measure intrinsic motivation, basic psychological needs, or SRL strategies on medical students or residents were included. Studies that were conducted on undergraduate or postgraduate students in colleges other than medicine were excluded. Additionally, studies that measured motivation from perspectives other than those described in SDT (e.g., attributions, goal orientation, etc.) were excluded. Also, studies that were concerned about what motivates students or residents to choose a specific speciality were excluded. As a result, 12 relevant studies were included from the online search. Furthermore, reference sections of these studies as well as for relevant journal articles, book chapters, and systematic reviews were scanned and two relevant empirical studies were included. Table 3 summarizes the 14 relevant empirical studies.

Table 3

Summaries of empirical studies reviewed

Study	Review category	Participants	Data gathered	Data analysis method	Conclusion
Artino et al. (2010)	Motivational beliefs (task value and self-efficacy), emotions, and academic achievements	136 second-year medical students	(1) Motivational beliefs survey and achievement emotion survey; (2) Course exam grade and national board self-examination scores.	Correlation and structural equation modeling	Students' motivational beliefs and achievement emotions have an important influence on academic achievements.
Artino et al. (2012)	SRL and achievement goal structure	175 medical students in preclinical years and 129 in clinical rotations	(1) Students' perception of achievement goal structure; (2) Students' learning behaviours; (3) GPA and clinical assessment.	Correlation analysis and MANOVA	Medical students' perceptions of the learning environment are related to their use of SRL behavior. This relationship occurs in a predictable way and tends to change across time in medical school.
Cook et al. (2011)	Motivation and achievement	210 residents in internal or family medicine enrolled in web-based	(1) Pre-course MSLQ scores; (2) Pre- and post-module motivation survey; (3) Post-module knowledge	Mixed linear model Confirmatory factor analysis	MSLQ motivation subscales are significantly correlated with knowledge scores. MSLQ scores reliably predict

		course on ambulatory medicine	test; and (4) Post-module Instructional Materials Motivation Survey (IMMS) scores.		meaningful outcomes.
Evensen et al. (2001)	SRL in PBL context	6 medical students	Observing students during PBL, multiple interviews, oral learning logs, assessment of students' notes and test materials.	Grounded theory method	Learning environment can affect the use of SRL strategies by students.
Kusurkar et al. (2012)	Motivation, study effort, and strategies	383 medical students	Gender, GPA, European credits, total hours devoted to self-study, AMS, and Revised Study Process Questionnaire.	Structural equation modeling	Autonomous motivation is an important factor that can affect academic performance and achievement.
Moreau & Mageau (2012)	Autonomy support and work satisfaction	Total of 597 students in dentistry, medicine, or veterinary medicine (medical residents =333)	The perceived autonomy support scale for employees, work satisfaction scale, subjective measures for wellbeing.	Regression analysis	Both supervisors' and colleagues' autonomy support can predict psychological health in work environment for health professionals.
Salamonson et al. (2009)	Learning strategies and interprofessional	100 first-year medical students and 565 first-year	Socio-demographics, MSLQ scores, and GPA.	Mann- Whiney *U*-test and chi-square test	There are differences in motivation and SRL between medical and nursing students,

	education	nursing students			which has an impact on their interprofessional education.
Sobral (2004)	Motivation	297 medical students	AMS, approaches to study inventory, and academic achievement measures.	ANOVA, correlations, and chi-square	Autonomous motivation is significantly correlated with academic achievements.
Stegers-Jager et al. (2012)	Motivation and SRL	Total of 672 first-year medical students	MSLQ scores (SRL and motivation: self efficacy and task value) and GPA.	Structural equation modeling analysis	Motivation, SRL, and achievement are related. Self-efficacy has a strong relation with academic performance.
Turan et al. (2009)	SRL and metacognitive awareness within different contexts	862 medical students from four different medical schools	SRL perception scale and metacognitive awareness inventory.	Student-*t* test, Kruskal Wallis analysis of variance, Mann Whitney *U* test.	Within PBL context, students report higher levels of metacognitive awareness and use of SRL strategies.
Turan et al. (2012)	SRL strategies and clinical achievement	309 medical students during surgical clerkship	MSLQ scores and clinical achievement assessment (case-based exam, OSCE, and tutor assessment).	Multi-linear regression analysis	Participants use SRL at a moderate level. SRL is related to clinical achievement.
White (2007)	SRL, motivation, and educational environment	36 medical students	Interview based-motivation, SRL use, educational environment.	Qualitative, thematic analysis	SRL can help students to face the change from classrooms into clerkships.

Wiel et al. (2011)	SRL and deliberate practice in workplace	50 physicians (including 19 residents)	Age, years of experience, working hours/week; semi-structured interviews to explore SRL strategies.	Qualitative, content analysis	Physicians' SR is driven by patients' care rather than for self-improvement.
Wood et al. (2011)	Informal SRL	313 medical students (third- and fourth-year)	Students reports of use of different learning strategies to enhance their learning during surgical rotation.	Thematic qualitative analysis	Medical students' informal use of SRL strategies mainly occur in the forethought and volitional control phases.

A careful review of these empirical studies revealed that SRL strategies are used, in varying degrees, by medical students and residents (Turan & Konan, 2012; Wood, Mylopoulos, & Brydges, 2011). Additionally, the use of SRL strategies is context-dependent (Artino et al., 2012; Evensen, Salisbury-Glennon, & Glenn, 2001; Turan, Demirel, & Sayek, 2009; White, 2007) and is significantly positively correlated with academic achievement (Salamonson et al. 2009; Turan & Konan, 2012). Results also revealed that the learning/working environment has an effect on the use of SRL strategies and the perception of some psychological needs (e.g., autonomy and relatedness). For instance, medical students report higher use of SRL strategies in problem-based learning (PBL) environments compared to traditional learning contexts (Turan et al., 2009). Additionally, Moreau and Mageau (2012) have concluded that for residents the people who surround them within their working environment (including supervisors and colleagues) have an effect on their perceived autonomy support, which, in turn, may be reflected in work satisfaction and wellbeing.

Of particular interest, autonomous motivation, as described in SDT, had a significant effect on the use of SRL strategies and, eventually, academic achievement (Kusurkar et al., 2012; Sobral, 2004). For example, Kusurkar et al. (2012) conducted a study in The Netherlands to identify relations between motivation as described in SDT and learning strategies among 383 medical students. Data collected included gender, GPA, and European credits as indicators of academic performance, as well as self-report on study effort in the form of total hours devoted to self-study. The study also measured motivation (as described in SDT) utilizing the Academic Motivation Scale (AMS). For the purpose of the research, the authors defined three variables of motivation: (1) autonomous motivation (AM), calculated by summing the average score of intrinsic motivation and identified regulation subscales; (2) controlled motivation (CM),

calculated by summing the average of introjected and external regulation; and (3) relative autonomous motivation (RAM), calculated by giving each subscale of AMS a certain weight to create a single variable that can give an indication of overall self-motivation. Scores on the study strategies used by students, namely, deep strategies (DS) (i.e., strategies used to maximize understanding of the material) and surface strategies (SS) (i.e., strategies used to memorize the material) were determined through use of the Revised Study Process Questionnaire-2 Factors. A Good Study Strategy (GSS) score was then calculated by subtracting the mean surface strategy score from the mean deep strategy score.

Data were analyzed by structural equation modeling and regression analysis. Results showed that RAM was significantly positively correlated with GSS and GPA. Gender differences significantly affected motivation and GPA. Male medical students had significantly higher controlled motivation and lower relative autonomous motivation and GPA compared to female medical students. The results of the structural equation modeling analysis also showed that RAM significantly affected GPA only indirectly, through GSS in female students and through study effort in male students. The authors of the study concluded that quality of motivation is an important factor that can affect academic performance and achievement. They suggest further research to encourage student use of effective learning strategies as well as more study effort through enhancing autonomous motivation.

In another study, Cook, Thompson, and Thomas (2011) conducted a study to evaluate the validity and reliability of the Motivated Strategies for learning questionnaire (MSLQ; Pintrich et al., 1993) scores among medical residents. They conducted a longitudinal study between January 2008 and June 2010 at the Mayo School for Graduate Medical Education in Rochester, Minnesota. Two hundred and ten internal medicine and family medicine residents enrolled in a

web-based course on ambulatory medicine were included in the study. Each year from 2008-2010, participating residents completed four web-based modules. Each module focused on common problems faced in ambulatory medicine (e.g., obesity, hypertension, asthma, etcetera), and the scientific content was revised and updated. Data collection included: (1) pre-course MSLQ (Pintrich et al., 1993) scores (i.e., before the first module of each year); (2) pre-module and post-module motivation survey; (3) post-module knowledge test; and (4) post-module Instructional Materials Motivation Survey (IMMS) scores. MSLQ subscales included in the study were intrinsic goal orientation, extrinsic goal orientation, task value, control of learning beliefs, self-efficacy, and test anxiety.

Analysis of the data showed that total MSLQ score had a statistically significant positive correlation with post-module knowledge scores. Apart from test anxiety, all subscales of the MSLQ showed a significant correlation with post-module knowledge score. Control of learning beliefs and self-efficacy subscales had the strongest positive relationship with knowledge scores. Analysis for internal consistency was high for all MSLQ subscales, Cronbach's alpha = .93 and $\alpha \geq .67$ for each domain. Results of the confirmatory factor analysis failed to show a good fit between empirical and theoretical data. Based on these results, Cook et al. concluded that MSLQ scores are reliable and can predict meaningful outcomes. However, a simplified model of MSLQ might lead to a better fit between empirical and theoretical data.

Conclusion of empirical study review. In conclusion, this review of empirical studies revealed that a few studies have attempted to clarify some aspects of the relations between basic psychological needs, autonomous motivation, and SRL among medical students/residents. The surrounding environment plays an important role in perceiving autonomy support and SRL use.

Moreover, autonomous motivation is linked to higher use of SRL strategies and better academic/clinical achievements.

Summary

Self-regulated learning is an important skill that enables medical residents to stay current with rapidly expanding knowledge and make sure that the practicing standards are met. SRL is not an automatic process; therefore, factors that help residents to engage in the SRL process should be enhanced. The link between motivation and SRL is well established in the literature; people who are more autonomously motivated report greater use of SRL strategies. Therefore, studying factors that help people to internalize their motivation is becoming an area of interest in many lines of inquiry in psychological research. It is evident that satisfying basic psychological needs (i.e., autonomy, competence, and relatedness) will help people internalize their motivation, thus becoming more autonomously motivated (Deci & Ryan, 2000; Ryan & Deci, 2000a, 2002).

Empirical studies that have been conducted in the medical field reveal that SRL is context-dependent and is linked to higher academic and clinical achievements. Some of the empirical studies have also shown that SRL is used by residents/students in varying degrees, some of which might be suboptimal. However, only a few studies have been conducted to examine factors that can enhance the use of SRL (i.e., basic psychological needs and intrinsic motivation). For instance, Kusurkar et al. (2012) conducted a study to examine relations between autonomy support, motivation, and some strategies of SRL among medical students. Other studies are needed to fill this gap in the medical education literature, which we hope to address in our study.

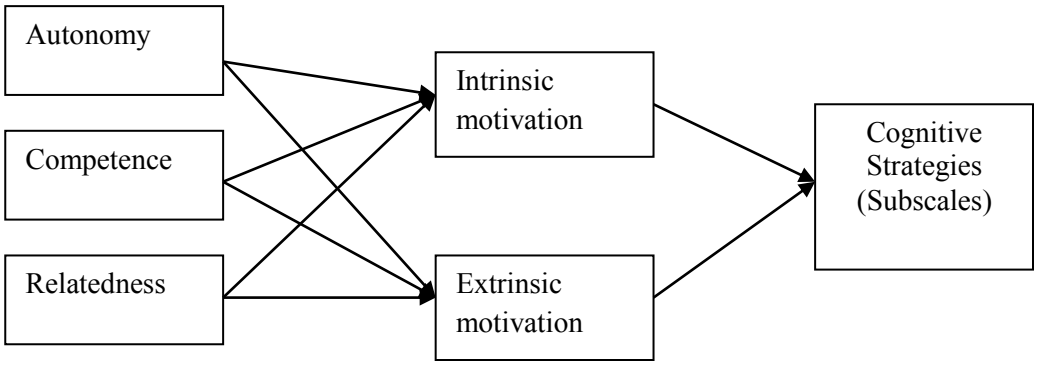
In this study, we explored the relationship between residents' perceived satisfaction of the three psychological needs (as described in SDT), their self-reported level of intrinsic

motivation, and their self-reported use of SRL strategies. This will potentially clarify these links to medical educators and highlight the importance of motivation, satisfying basic psychological needs at work, and the utilization of SRL strategies by residents. Additionally, this research may enhance further research attempting to develop strategies targeted towards attaining higher engagement in SRL among medical residents. As such, our research questions are the following: (1) What is the relationship between basic psychological needs, intrinsic motivation, and SRL among residents? (2) Does intrinsic motivation mediate the relationship between basic psychological needs and SRL strategies among residents?

Based on theoretical and empirical considerations, we hypothesized that the higher the perceived levels of basic psychological needs at work, the higher the reported level of SRL strategies used by residents, and that intrinsic motivation will mediate relations between the basic psychological needs and use of SRL strategies. The proposed model is presented in Figure 2. In our study, we consider SRL strategies to be an outcome itself of the satisfaction of basic psychological needs. Although the ultimate outcome of high intrinsic motivation and SRL strategies is higher academic achievement, the latter will not be measured in this study for several reasons, such as the fact that there is no single academic achievement test that can be generalized to all participants from different departments.

Figure 2

Path analysis model showing relations between basic psychological needs and self-reported learning strategies.



CHAPTER 2

Methodology

Participants

A total of 198 residents filled out the questionnaire (117 online and 81 hard copy, see procedure section below for more details). Out of these questionnaires, 86 responses from the online questionnaire and 74 responses from the hard copy questionnaire were complete. The details of missing items of the incomplete responses are presented the results section.

Collectively, a total of 160 responses were included in the analysis. Online and hard copy questionnaires were included in the analysis. Of those, 75 participants were male (46.9%) and 84 were female (52.5%). One participant did not specify sex. The mean age of participants was 28.5 years (minimum 23 years and maximum 38 years). Demographic data are summarized in Table 4.

The residents who participated in the study represent all of the included departments (i.e., anaesthesiology, emergency medicine, family medicine, general surgery, internal medicine, obstetrics and gynecology, pediatrics, and radiology) and their subspecialties (e.g., cardiology, endocrinology, cardiac surgery, etc.). Table 5 summarizes the number of residents from each department. Residents from all post-graduate year levels (PGY 1 – PGY 6) participated in the study. Table 6 summarizes the number of residents from each PGY level.

Table 4

Demographics

Variable	*n*	%
Sex		
Male	75	46.9
Female	84	52.5
Missing	1	.6
Age		
23-25	27	16.8
26-30	91	56.9
31-35	37	23.1
36-38	4	2.5
Missing	1	.6
PBL		
Yes	97	60.6
No	62	38.8
Missing	1	.6

Table 5

Participating residents from each department

Department	*n*	%
Anesthesiology	13	8.1
Emergency medicine	9	5.6
Family medicine	17	10.6
General surgery	31	19.4
Internal medicine	41	25.6
Obstetrics and gynecology	16	10.0
Pediatrics	23	14.4
Radiology	10	6.3

Table 6

Participating residents' PGY levels

PGY level	*n*	%
1	49	30.6
2	38	23.8
3	36	22.5
4	21	13.1
5	10	6.3
6	4	2.5
Missing	2	1.3

Materials

Demographics. Age, sex, speciality and post graduate year (PGY) level was collected as demographic data. We also asked the residents to answer by yes or no whether they have been previously exposed to problem based learning (PBL), as PBL courses have been associated with

better utilization of SRL strategies by medical students (Evanson, Salisbury-Glennon, & Glenn, 2001; Turan, Demirel & Sayek, 2001). Ninety-seven residents (60.6%) reported previous exposure to a problem-based learning (PBL) system.

Basic Psychological Needs. The Basic Psychological Needs (BPNS) scale was used to measure autonomy, competence, and relatedness variables. This questionnaire was based on SDT (Deci & Ryan, 1985, 2000). The original version was first adapted from the need satisfaction at work questionnaire by Ilardi, Leone, Kasser, and Ryan (1993). The general version consists of 21 items: 13 items to reflect autonomy, 10 items to reflect competence, and 8 items to reflect relatedness. All items are scored using a Likert-type scale. There are multiple modified versions of the original scale to fit different life domains (Deci, Ryan, Gangne, Leone, Usunov, & Kornazheva, 2001; Ilardi, Leone, Kasser, & Ryan, 1993; Symeon, Michailidou, & Michailidou, 2006). For the present study, we used a shortened version of 15 items, each rated on a seven-point Likert scale, ranging from 1 (not at all true for me), 4 (somewhat true for me), to 7 (very true for me). We elected to use a shortened version of the questionnaire given that residents' free time is limited and also that there are multiple other variables to be measured (i.e., motivation and SRL variables). The followings are sample items from each subscale: (1) autonomy: "When I am at work, I have to do what I am told"; (2) competence: "Most days I feel a sense of accomplishment from working"; (3) relatedness: "I get along with people at work." The complete list of items included in this scales is presented in Appendix 1. Reliability Cronbach's alpha scores were .607, .649, and .723 for autonomy, competence, and relatedness subscales respectively.

Motivation. The Academic Motivation Scale (AMS; Vallerand et al, 1992) was used to measure residents' motivation according to SDT taxonomy (Figure 1). AMS is a validated tool to

measure motivation with a mean alpha score of .80 (Vallerand et al, 1993). The College version of AMS scale was used with a few modifications to suit residents' environment. AMS consists of 28 items that are grouped into seven subscales (i.e., four items per subscale). The seven subscales are (a) intrinsic motivation – to know, (b) intrinsic motivation – towards accomplishment, (c) intrinsic motivation – to experience stimulation, (d) extrinsic motivation – identified regulation, (e) extrinsic motivation – introjected regulation, (f) extrinsic motivation – external regulation, and (g) amotivation. Intrinsic motivation – to know is to study for the pleasure and satisfaction experienced while learning (Vallerand et al, 1992). Intrinsic motivation – toward accomplishment is to study for the pleasure and satisfaction experienced while accomplishing things (Vallerand et al, 1992). Intrinsic motivation – to experience stimulation is to study in order to experience stimulating sensations (Vallerand et al, 1992).

Residents indicated to what extent each item corresponds to the reasons why they joined residency program according to 7-point Likert scale which ranged from 1 (does not corresponds at all to me), 4 (corresponds moderately), to 7 (corresponds exactly to me). The followings are sample items from each subscale: (1) intrinsic motivation- to know: " because I experience pleasure and satisfaction while learning new things"; (2) intrinsic motivation- toward accomplishment: " for the satisfaction I feel when I am in the process of accomplishing difficult academic activities"; (3) intrinsic motivation- to experience stimulation: " for the pleasure I experience when I read about interesting cases"; (4) extrinsic motivation- identified: " because I think that residency will help me better prepare for the career I have chosen"; (5) extrinsic motivation- introjected: " because of the fact that when I succeed in residency I feel important"; (6) extrinsic motivation- external regulation: " because with only a bachelor medical degree I would not find a high-paying job later on"; (7) amotivation: " honestly, I don't know; I really

feel that I am wasting my time in this residency program." The complete list of items included in AMS is presented in Appendix 1. Reliability Cronbach's alpha scores were .902 for intrinsic motivation and .739 for extrinsic motivation.

Self-regulated learning. The Motivated Strategies for Learning Questionnaire (MSLQ; Pintrich et al., 1993) was used to measure residents' self-reported learning strategies. MSLQ (Pintrich et al., 1993) is a validated self-report instrument to measure students' learning strategies (i.e., SRL). SRL items are classified into three subscales: (1) cognitive subscale, which includes rehearsal, elaboration, organization, and critical thinking; (2) metacognitive strategies subscale; and (3) resource management subscale, which includes time and study environment, effort regulation, help seeking, and peer learning. Internal consistency for each subscale was measured by Cronbach's alpha, which ranged from .52 to .93 (Garcia & Pintrich, 1996). MSLQ subscales may be used collectively or separately (Duncan & McKeachie, 2005). For this study, all SRL subscales were included. A few modifications were made to the questionnaire items to suit residents' environment (e.g., use residents instead of students and rotation instead of class).

Thirty items for self-reported learning strategies were used in our study; each item is rated on a seven-point Likert scale, ranging from 1 (not at all true for me) to 7 (very true for me). The followings are sample items from each subscale: (1) cognitive – rehearsal: "I make lists of important ideas for this rotation and memorize the list"; (2) cognitive – elaboration: "when reading for this rotation, I try to relate the material to what I already know"; (3) cognitive-organization: "When I study for this rotation, I go through the readings and my notes and try to find the most important ideas"; (4) cognitive- critical thinking: "I treat the reading material as a starting point and try to develop my own ideas about it"; (5) metacognitive strategies: "if the

reading materials are difficult to understand, I change the way I read the material"; (6) resource management – time and study environment: "I make a good use of my study time for this rotation"; (7) resource management – effort regulation: "when reading material is difficult, I give up or only study the easy parts"; (8) resource management – help seeking: "I ask the staff to clarify concepts I don't understand well"; (9) resource management – peer learning: "When studying for this rotation, I often set aside time to discuss the reading material with a group of colleagues from the rotation." The complete list of items included in these scales is presented in Appendix 1. Reliability Cronbach's alpha scores were .743, .573, and .705 for cognitive, metacognitive, and resource management strategies subscales respectively.

Procedure

Upon obtaining the ethics approval in January 2014 from the Institutional Review Board (IRB) of the Faculty of Medicine at McGill University (Appendix 2), emails were sent to each program director of the following departments (anaesthesiology, emergency medicine, family medicine, general surgery, internal medicine, obstetrics and gynecology, pediatrics, and radiology) to attain approval to contact their residents (Appendix 3). After that, residents were sent invitation emails (Appendix 4) along with consent form (Appendix 5) through the administrative assistants of each department. Responses were collected online. Reminder emails were sent to the residents through the administrative assistants of each department during the second week of February. The online responses were insufficient to conduct the analysis (only 86 complete responses out of 117); therefore, hard copy versions of the questionnaire were distributed to the residents of the following departments (anaesthesiology, emergency medicine, family medicine, general surgery, internal medicine, obstetrics and gynecology, pediatrics, and radiology) to increase our reach area. Hard copies were distributed to residents through

collaboration with the departments' administrative assistants and chief residents. Only residents who had not previously completed the online questionnaire were allowed to complete the printed version of the questionnaire. To ensure the anonymity of participants, residents who used the hard copy version were asked to submit their emails into the draw in a box that was separate from the questionnaire response box.

CHAPTER 3

Results

Preliminary data analysis

Missing data. Online responses with missing data (31 responses) were excluded from the analysis, as scores of the basic psychological needs, AMS, and/or MSLQ scales were missing (minimum missing items was 28, as most of the incomplete responses included all AMS and MSLQ items or part of them). One online response with missing information on sex was included in the analysis as all the scores of the mentioned scales above were complete and, as such, the data analysis was not affected.

Six hard copy responses included missing motivation or SRL data and were excluded from the analysis. Three of the hard copy questionnaires were missing age or PGY level as part of the demographic data; however, they were included in the analysis.

Data checking. IBM SPSS 19 was used for data analysis along with MEDIATE macro for SPSS (Preacher & Hayes, 2008). We first checked for the normality of each subscale of the three questionnaires (i.e., BPNS, AMS, and MSLQ). Kurtosis scores ranged from -.39 to 1.9 and skewness scores ranged from -1.0 to .059. Both absolute scores of skewness and kurtosis did not exceed the acceptable cut-offs, which are 3 for skewness and 8 for kurtosis (Kline, 1998). After checking for normality, descriptive statistics were generated for demographics data and questionnaires scores (i.e., mean, standard deviations) (Table 7). Cronbach's alpha (reliability score) was calculated for each subscale in the three questionnaires (BPNS, AMS, and MSLQ) (Table 7). Pearson's correlation coefficients between the subscales of the three questionnaires are presented in Table 8.

Table 7

Descriptive statistics and Cronbach's α for BPNS, AMS, and MSLQ

Scale	Mean	SD	Cronbach's α
Autonomy	4.25	.87	.607
Competence	5.25	.84	.649
Relatedness	5.43	.83	.723
Intrinsic motivation	4.95	1.04	.902
Extrinsic motivation	4.68	.91	.739
Cognitive strategies	4.10	.85	.743
Metacognitive strategies	4.52	1.00	.573
Resource management strategies	4.07	.80	.705

Table 8

Pearson's correlation coefficients between subscales of BPNS, AMS, and MSLQ

		1	2	3	4	5	6	7	8	9
1	Autonomy	1								
2	Competence	.517[b]	1							
3	Relatedness	.477[b]	.489[b]	1						
4	IM	.227[b]	.329[b]	.245[b]	1					
5	EM	.076	.191[a]	-.030	.404[b]	1				
6	AM	-.402[b]	-.538[b]	-.299[b]	-.372[b]	-.098	1			
7	CG	.036	.173[a]	.008	.339[b]	.147	.008	1		
8	MC	.160[a]	.283[b]	.120	.331[b]	.033	-.154	.665[b]	1	
9	RM	.299[b]	.403[b]	.243[b]	.359[b]	.006	-.21[b]	.563[b]	.606[b]	1

Note: IM = intrinsic motivation, EM = extrinsic motivation, AM = amotivation, CG = cognitive strategies, MC = metacognitive strategies, RM = resource management strategies

[a] Correlation is significant at .05 level. [b] Correlation is significant at .01 level

Bivariate Correlations. The bivariate correlations presented in Table 8 show a statistically significant positive relationship between intrinsic motivation and each SRL strategy (i.e., cognitive strategies $r = .339$, $p < .01$, metacognitive strategies $r = .331$, $p < .01$, and resource management strategies $r = .359$, $p < .01$). In contrast to intrinsic motivation, extrinsic motivation did not show any significant bivariate correlation with any SRL strategies (i.e., cognitive strategies $r = .147$,$p > .05$, metacognitive strategies $r = .033$, $p > .05$, and resource management strategies $r = .006$, $p > .05$).

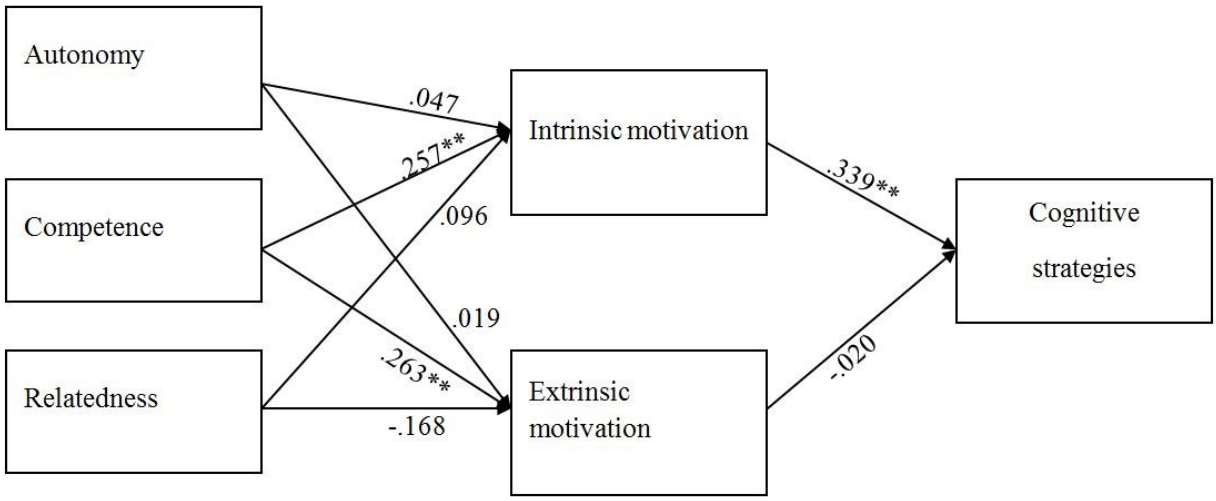
Each of the three basic psychological needs had a statistically significant relationship with intrinsic motivation, $r = .227$, $r = .329$, $r = .245$, $p < .01$ for autonomy, competence, and relatedness, respectively. Autonomy had a significant positive correlation with metacognitive strategies $r = .160$, $p < .05$ and resource management strategies $r = .229$, $p < .01$. Competence had a significant positive relationship with the three SRL strategies (i.e., cognitive strategies $r = .173$, $p < .05$, metacognitive strategies $r = .283$, $p < .01$, and resource management strategies $r = .403$, $p < .01$). Relatedness showed a significant positive relationship only with resource management strategies $r = .243$, $p < .01$.

Path Analysis. Mediate macro (Preacher & Hayes, 2008) for IBM SPSS 19 was used to examine the direct and indirect relationships between basic psychological needs, motivation, and SRL strategies according the diagram illustrated in Figure 2. We first examined the relationship between basic psychological needs, intrinsic motivation (IM), and extrinsic motivation (EM) as predictors of cognitive SRL strategies, as illustrated in Figure 3. The model was statistically significant $F(5,154) = 4.85$, $p < .01$, ($R^2 = 13.62\%$). Cognitive strategies were significantly predicted from intrinsic motivation $B = .339$, $t(158) = 3.92$, $p < .01$. Competence had a

significant direct relationship with intrinsic motivation $B = .257$, $t\ (158) = 2.77$, $p < .01$, and extrinsic motivation $B = .263$, $t\ (158) = 2.74$, $p < .01$. No mediation was found.

Figure 3

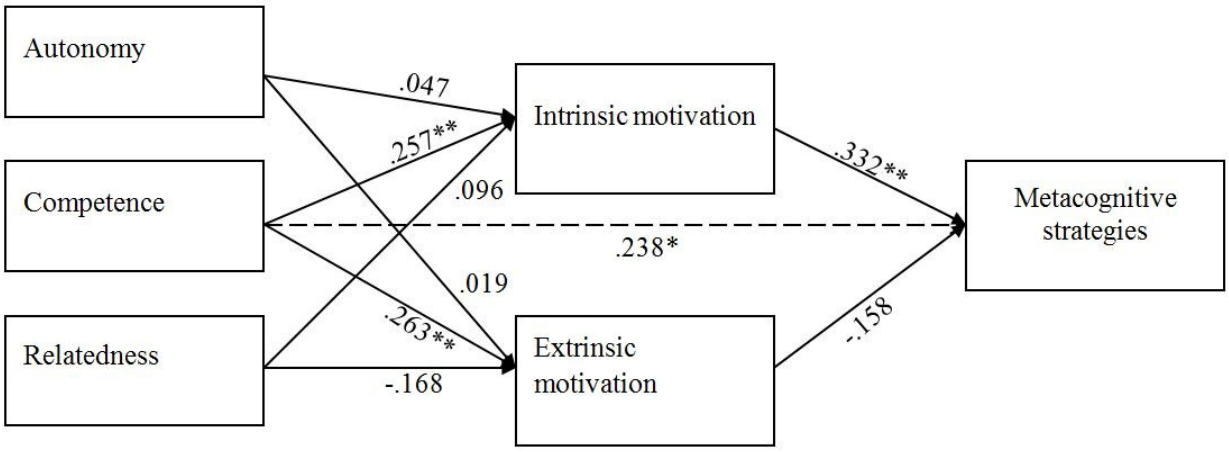
Path analysis for cognitive SRL strategies



Examining the relationship between basic psychological needs, intrinsic motivation, and extrinsic motivation as predictors of metacognitive SRL strategies (Figure 4) showed a significant model $F\ (5,154) = 6.04$, $p < .01$, ($R^2 = 16.41\%$). Metacognitive SRL strategies were significantly predicted from intrinsic motivation $B = .332$, $t\ (158) = 3.89$, $p < .01$ and competence $B = .238$, $t\ (158) = 2.53$, $p < .05$. Competence had a significant direct relationship with intrinsic motivation $B = .257$, $t\ (158) = 2.77$, $p < .01$ and extrinsic motivation $B = .263$, $t\ (158) = 2.74$, $p < .01$. The confidence interval of the indirect effect of competence on metacognitive SRL strategies was (.029 - .214), which indicates a complete mediation between competence and metacognitive strategies through intrinsic motivation.

Figure 4

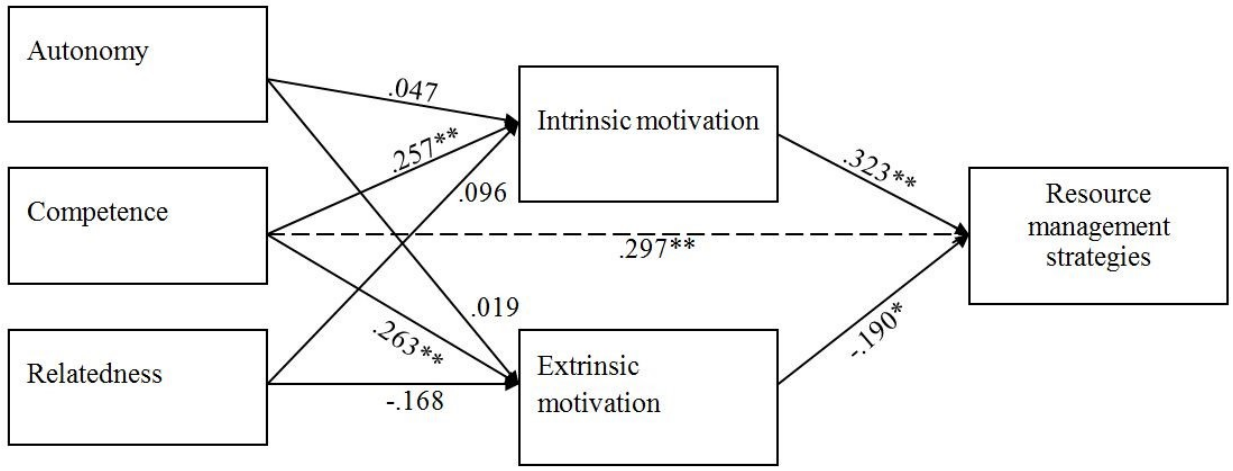
Path analysis for metacognitive SRL strategies



Finally, we examined the relationship between basic psychological needs, intrinsic motivation, and extrinsic motivation as predictors of resource management SRL strategies (Figure 5). This model was statistically significant F (5,154) = 10.655, $p < .01$, (R^2 = 25.70%). Resource management strategies were significantly predicted from intrinsic motivation B = .323, t (158) = 4.02, $p < .01$, extrinsic motivation B = -.190, t (158) = -2.45, $p < .05$, and competence B = .297, t (158) = 3.35, $p < .01$. Competence had a significant direct relationship with intrinsic motivation B = .257, t (158) = 2.77, p <.01 and extrinsic motivation B = .263, t (158) = 2.74, $p <$ .01. The confidence interval of the indirect effect of competence on metacognitive SRL strategies was (.026 - .176), which indicates a complete mediation between competence and resource management strategies through intrinsic motivation. Path analyses for the three SRL strategies were also conducted, by controlling for demographics as covariates (i.e., age, sex, department, PGY-level, and previous exposure to PBL). None of the covariates showed a significant change in results, thus were not included in the models.

Figure 5

Path analysis for resource management strategies



CHAPTER 4

Discussion

The purpose of this study was to determine if there is a relationship between satisfying the three basic psychological needs, intrinsic motivation, and different SRL strategies used by residents. We hypothesized that the higher the perceived levels of basic psychological needs at work, the higher the reported level of SRL strategies used by residents. Our research questions were as follows: (1) What is the relationship between basic psychological needs, intrinsic motivation, and SRL among residents? (2) Does intrinsic motivation mediate the relationship between basic psychological needs and SRL strategies among residents?

This discussion section is divided into four parts. In the first part, we will discuss the preliminary data analysis; the path analysis and mediation analysis will be examined in the second part. The third part will discuss some methodological issues and limitations of our study design. The last part of the discussion will focus on theoretical and practical implications and will provide future suggestions in light of our discussion of the results. Our discussion will be followed by a short conclusion.

Preliminary Analysis Discussion

Each of the three basic psychological needs showed a positive relationship with intrinsic motivation, which is consistent with SDT (Deci and Ryan, 2000). Residents who felt more autonomous at work reported using more metacognitive and resource management SRL strategies. Residents who felt more competent at work reported using more cognitive, metacognitive, and resource management SRL strategies. On the other hand, residents who felt more relatedness to other people in the working environment reported using more resource

management strategies only. To our present knowledge, there are scant studies that directly correlate the three basic psychological needs, intrinsic motivation, and SRL strategies in the medical field. Our findings are consistent with other studies mentioned in the literature review, which conclude that the perception of autonomy and competence for clinicians is thought to reflect positively on their SRL behaviours (Brydges & Butler, 2012; Hoffman & Donaldson, 2004; Sandars & Cleary, 2011;). Additionally, Stok-Koch, Bolhuis, and Koopmans (2007) suggest that feelings of relatedness can help residents focus on their learning process.

Results from the correlation analysis revealed that intrinsic motivation was an important predictor for the three SRL strategies; this contrasts with extrinsic motivation, which did not show any significant relation with different SRL strategies. Our findings contradict Wiel et al.'s (2011) conclusion that while residents are only externally motivated by their patients to provide high-quality patient care, this motivation is not sufficient to drive them to be efficient self-regulated learners. Wiel et al. (2011) identify valuable potential areas of improvement regarding how residents and physicians self-regulate their learning. However, the authors interpret interviewees' responses that illustrate the importance of patient care as a key point that explains why they are not efficient self-regulated learners who rely mainly on reflexive reactions tied to patient condition to engage in self-regulated learning. We believe that this is not an accurate interpretation of this attitude, as health care professionals have traditionally utilized the pathologies they encounter during their duty as opportunities to learn more about the pathologies rather than merely as a search for answers to manage a specific patient (Bethune & Brown, 2007; Fafard & Snell, 1989). In the context of the dichotic work/learn environment within which residents work, this described attitude can actually be an example of residents utilization of metacognitive and resource management strategies during work and does not reflect an absence

of an intrinsic motivation to learn. Also, the study exclusively included residents and practicing physicians in internal medicine departments who have direct interaction with patients, which cannot be generalized to all medical specialities. On the contrary, our study included residents from various specialities, some of whom do not directly interact with patients, which partly precluded us from examining the effect of patients as an external motivator. Despite this, we have illustrated that residents who are intrinsically motivated reported more use of SRL strategies than residents who are extrinsically motivated.

Path Analysis and Mediation Discussion

Results from the path analysis revealed that residents who felt that their competence needs were being satisfied were intrinsically motivated to learn. However, satisfaction of autonomy and relatedness did not show a relation with intrinsic motivation as occurred in the bivariate correlation results. This could be due to the fact that path analysis, which depends on multiple regression, highlights the most significant predictors of intrinsic motivation. The high degree of correlation in the bivariate analysis between autonomy, competence, and relatedness further supports this interpretation.

Results also showed that satisfaction of competence stands out as a significant predictor for two of the SRL strategies (i.e., metacognitive and resource management strategies). Residents who felt more competent reported more use of metacognitive and resource management strategies consistently through all PGY levels and all departments. This is of particular interest, as residents are expected to be more competent as they progress in PGY levels as a result of their acquisition of knowledge and skill through their years of training. Despite this, the residents reported more use of SRL strategies, namely metacognitive and resource management strategies, when they perceived high levels of self-competence regardless of their

year of training, which should correlate with actual competence in their field of training. The reported levels of confidence would likely reflect a relative competence to what residents feel is appropriate to their level of training. This would suggest that fostering feelings of competence in residents can potentially lead to more use of SRL strategies. This is an important finding that can have multiple practical implications, which will be discussed in the last part of this chapter.

Most of the studies conducted in the medical field have focused on satisfaction of autonomy, which will lead to more autonomous motivation (i.e., intrinsic motivation) and thus increase use of SRL strategies and academic achievements (Kusurkar et al., 2012; Sobral, 2004). However, in our path analysis, autonomy satisfaction did not show a significant relationship with the three SRL strategies. This could be due to the fact that working in a hospital environment and dealing with patients' lives will always imply limited autonomy of the medical teams with, rightfully, continuous supervision and guidance from more experienced medical staff. This will limit the perception of autonomy in favour of ensuring patient safety. Hence, the perception of autonomy will always be limited and is always relative to what is expected. Another explanation of this is that even if residents–who are from different levels and department–feel autonomous at work, the variability of autonomy satisfaction is smaller than what our sample could detect.

Like autonomy, the feeling of relatedness did not show a significant effect on the use of SRL strategies in our path analysis model. The correlation between the perceived competence and relatedness was high. This indicates that residents who felt competent at work also felt related to their surrounding environment. Therefore, competence might potentially play a role in boosting the feeling of relatedness; however, we cannot verify this effect from the available study data. Previous studies have noted that satisfying one of the three psychological needs can lead to satisfying the others, which can explain the noted association (Deci et al., 2001; Jang et

al., 2009; Williams et al., 2004; Ten Cate et al., 2011; Vallerand et al., 1997). This can explain why we did not observe a significant effect of relatedness on the use of SRL strategies in the path analysis model, as it is in close correlation with competence and shares a significant portion of its variance. Hence, competence stands out as the most significant variable among the three psychological needs driving a positive effect on intrinsic motivation and the SRL strategies in residents. However, given the high degree of correlation between the three psychological needs, autonomy and relatedness continue to be important variables but do not significantly account for the additional effects on intrinsic motivation and SRL strategies after accounting for the effect of competence.

Examining the path analyses more carefully showed that residents who were more intrinsically motivated reported using more SRL strategies (i.e., cognitive, metacognitive, and resource management strategies), which is consistent with our results in the bivariate correlation. Residents who were extrinsically motivated did not report more use of SRL strategies; indeed, they reported less use of resource management strategies. This is an interesting point that solidifies the understanding that residents are more intrinsically motivated to learn and to self-regulate their learning, which contrasts with Wiel et al.'s (2011) conclusion mentioned earlier in the bivariate correlation discussion.

One of the primary reasons we used path analysis was to try and understand the causal relationship in the complex psychosocial network between BSN satisfaction, motivation, and SRL. As was previously hypothesized, our model supports a mediation relationship between satisfying elements of the basic psychological needs–such as competence–and SRL strategies (i.e., metacognitive and resource management strategies). This would indicate that residents' internalization of motivation is a pivotal factor in boosting their use of SRL. We have shown that

this can be achieved by satisfying their basic psychological needs, particularly their self-perceived levels of competence.

Although 60.6% of residents participating in our study reported previous exposure to a problem based learning (PBL) environment, this did not seem to have any significant measurable effect on their use of SRL strategies. This can imply that use of SRL strategies among medical residents does not profoundly rely on previous exposure to PBL. In other words, the surrounding environment plays a major role in promoting the use of SRL strategies regardless of previous acquired skills and experience such as PBL exposure. On the other hand, the correlational nature of our study design may have also contributed to attenuate the effect of previous exposure to PBL systems on the use of SRL strategies. It would be more relevant if we could explore the current environment of residents during our study; however, this was unpractical. In fact, different studies in the medical field, mentioned in the review of empirical study section, were able to demonstrate a positive effect of PBL systems on the use of SRL strategies among medical residents (Evensen et al., 2001; Ozuah, Curtis, & Stein, 2001; Turan et al., 2009; White, 2007).

Although we acknowledge that previous exposure to a PBL system and context play a role in the use of SRL strategies, we did not measure either of these factors in our study. This point might be an interesting area for future studies.

Methodological Issues and Limitations

This study design has a number of limitations. One important limitation is the use of a single center (McGill University), which may potentially limit the generalizability of the results. Despite this, McGill University encompasses multiple teaching and community-based hospitals, through which a large number of residents rotate. We also invited residents from multiple

medical specialities (i.e., medical, surgical, and non-clinical) to better represent different working environments. The sample size was sufficient to have good statistical power for path analysis and was representative of all the included departments and all the PGY levels.

Another limiting factor was the correlational nature of the study. Our ability to conclude definitive causal relations is limited by the correlational design. However, given the absence of similar studies done in medical residents, this study remains a good start towards further research in this field.

Another limiting factor in this study's design was the sole reliance on self-reports for measuring SRL, which may not reflect the actual use of SRL. Garcia and Pintrich (1996) argue against the reliability, internal consistency, and validity of self-reported use of SRL strategies. We understand that this is an inherent limitation in our study's design, given that designing a study method to observe and trace the actual act of using SRL strategies is difficult to conduct in residents' working and learning environments. However, self-reporting has been recognized as a reliable method of measuring the use of different learning strategies (Winne, Jamieson-Noel, & Muis, 2002). Additionally, self-reporting has been recognized as a reliable method of measuring the perceived satisfaction of basic psychological needs (Ntoumanis, 2005; Ryan & Deci, 2006; Vallerand et al., 1997;).

One of the limitations that was brought up by participants is the lack of time to read, study, and use different SRL strategies. Although, the working hours are quite similar between departments, the actual number of hours spent by resident varies according to department, workload, and number of night/weekend duties for each residents. This time factor was difficult to assess and measure in our cross-sectional study design. We believe that the time factor may

represent an important covariate for SRL strategies. This issue can be examined in future longitudinal study designs.

Theoretical and practical implications

There are several ways that this study can add to medical education literature. First, this is the first study, to our knowledge, that directly links the basic psychological needs, motivation, and SRL for medical residents. Some studies focused on motivation and how it can impact the use of SRL strategies (Artino et al., 2012; Kusurkar et al., 2012; Stegers-Jager et al., 2012; Wiel et al., 2011) and academic achievements (Kursurkar et al., 2012; Sobral, 2004; Turan et al., 2012). Adding the element of basic psychological needs to this equation leads to practical implications, as medical students' or residents' perceptions of basic psychological needs can be altered by different educational strategies. Kursurkar et al. (2011) have suggested some practical classroom tips to enhance motivation in medical schools. Some of these tips were related to satisfying those psychological needs. These tips can be applied to and modified for different medical educational environments. The effectiveness of these strategies and other strategies to enhance basic psychological needs satisfaction can also be examined in a future structured interventional study.

Our study also contributes to the medical education literature by solidifying the idea that satisfying the need of competence for medical residents is an important predictor for their intrinsic motivation and use of SRL strategies. It was impressive that the residents who felt more competent reported more use of all three SRL strategies; which was consistent with all PGY levels thorough all participating departments. This can have a major impact on the education and the training of residents. All residents are learners seeking to master knowledge and skills

relevant to their specialities. Educators can play a major role in feeding feelings of competence or incompetence in their trainees, depending on their attitudes and methods of instruction. Our data implies that fostering the feeling of perceived competence at any level of training will only encourage the residents to learn and work more efficiently as they become more intrinsically motivated. This would suggest that feelings of competence, which are fed by relevant instruction and teachers' positive attitudes, are of major importance in driving residents to be motivated to learn more and work more efficiently.

Conclusion

Self-regulated learning is an important skill for medical residents to help them keep up their knowledge and pass exams within their busy schedule. Being intrinsically motivated is an important factor to enhance and improve this skill. According to self-determination theory, satisfaction of the three basic psychological needs is an important factor of intrinsic motivation.

The aim of this study was to examine the relationship between basic psychological needs, intrinsic motivation, and the use of different SRL strategies among medical residents. Despite having the limitations mentioned above, this study contributes to the medical education literature by examining motivation and SRL strategies on an important population in the medical field, medical residents. In summary, our results highlight the importance of satisfying needs of competence and how it can reflect on the use of different SRL strategies by residents.

References

Artino, A. R. Jr., Dong, T., Dezee, K. J., Gilliland, W. R., Waechter, D. M., Cruess, D., & Durning, S. J. (2012). Achievement goal structures and self-regulated learning: Relationships and changes in medical school. *Academic Medicine*, *87,* 1375-1381. doi: 10.1097IAMC.0b013e3182676b55

Artino, A. R., La Rochelle, J. S., & Durning, S. J. (2010). Second-year medical students' motivational beliefs, emotions, and achievement. *Medical Education, 44*, 1203-1212. doi:10.1111/j.1365-2923.2010.03721.x

Baard, P. P., Deci, E. L., & Ryan, R. M. (2004). Intrinsic need satisfaction: A motivational basis of performance and well-being in two work settings. *Journal of Applied Social Psychology, 34*(10), 2045-2068.

Bandura, A. (1977). *Self-Efficacy: The exercise of control.* New York: W.H. Freeman.

Bandura, A. (1986). *Social foundations of thought and action: A social cognitive theory.* Englewood Cliffs, NJL Prentice-Hall.

Bethune, C., & Brown, J. B. (2007). Residents' use of case-based reflection exercises. *Canadian Family Physician,* 53 (3), 470-476.

Brody, G.H., Stoneman, Z., Flor, D. (1996). Parental religiosity, family processes, and youth competence in rural, two-parent African American families. *Developmental Psychology, 32,* 696-706.

Brown, A., Bransford, J., Ferrara, R., & Campione, J. (1983). Learning, remembering, and understanding. In P. Mussen (Series Ed.) & J. Flavell & E. Markman (Eds.), *Handbook of child psychology*: Vol. 3. Cognitive development (pp. 77–166). New York: Wiley.

Brydges, R., & Butler, D. (2012). A reflective analysis of medical education research on self-regulation in learning and practice. *Medical Education, 46,* 71-79. Doi: 10.1111/j.1365-2923.2011.04100.x

Choudhry, N. K., Fletcher, R. H., & Soumerai, S. B. (2005). Systematic review: The relationship between clinical experience and quality of health care. *Annuals of Internal Medicine, 142* (4)*,* 260-273.

Cook, D. A., Thompson, W. G., & Thomas, K. G. (2011). The motivated strategies for learning questionnaire: Score validity among medicine residents. *Medical Education, 45,* 1230-1240. doi: 10.1111/j.1365-2923.2011.04077.x

Deci, E. L., & Ryan, R. M. (1985). *Intrinsic motivation and self-determination in human behaviour.* New York: Pelnum.

Deci, E. L., & Ryan, R. M. (2000). The "what" and "why" of goal pursuit: Human needs and the self-determination of behavior. *Psychological inquiry, 11(4),* 227-268.

Deci, E. L., & Ryan, R. M. (2002). Handbook of self-determination research. Rochester, NY: University of Rochester Press.

Deci, E. L., (1975). *Intrinsic Motivation.* New York: Plenum.

Deci, E. L., Koestner, R., & Ryan, R. M. (2001). Extrinsic rewards and intrinsic motivation in education: reconsidered once again. *Review of Educational Research, 71,* 1-27.

Deci, E., Ryan, R., Gangne, M., Leone, D., Usunov, J., & Kornazheva, B. (2001). Need satisfaction, motivation, and well-being in the work organizations of a Former Eastern Bloc Country: A cross-cultural study of self-determination. *Personality and Social Psychology Bulletin, 27 (8),* 930-942.

Duffy, F. D. (2008). Commentary: Training internists for practice focused on meeting patient needs. *Academic Medicine, 83 (10),* 893- 896.

Duncan, T. G., & McKeachie, W. J. (2005). The making of the motivated strategies for learning questionnaire. *Educational Psychologist*, *40*, 117-128

Dyrbye, L. N., Thomas, M. R., & Shanafelt, T. D. (2005). Medical student distress: causes, consequences, and proposed solutions. Mayo Clinic Proceedings, 80(12), 1613-1622. doi: S0025-6196(11)61057-4 [pii] 10.4065/80.12.1613

Dysvik, A. & Kuvaas, B. (2011). Intrinsic motivation as a moderator on the relationship between perceived job autonomy and work performance. *European Journal of Work and Organizational Psychology, 20 (3)*, 367-387, DOI: 10.1080/13594321003590630

Epstien, R. M., Siege, D. J., & Silberman, J. (2008). Self-Monitoring in clinical practice: A challenge for medical educators. *Journal of Continuing Education in the Health Profession, 28(1),* 5-13. DOI: 10.1002/chp.149.

Evensen, D., Salisbury-Glennon, J., & Glenn, J. (2001). A qualitative study of six medical students in a problem based curriculum: Toward a situated model of self-regulation. *Journal of Educational Psychology, 93 (4),* 569-676. doi: 10.1037//0022-0663.93.4.659

Fafard, J., & Snell, L. (1989). Reading habits of House-staff: What, Where and Why. *Medical Teacher, 11 (3-4),* 279-283. doi: 10.3109/01421598909146413

Flavell, J. H. (1976). Metacognitive aspects of problem solving. In L. Resnick (Ed.), The *nature of intelligence* (pp. 231–235). Hillsdale, NJ: Lawrence Erlbaum Associates.

Flavell, J. H. (1979). Metacognition and cognitive monitoring: A new of cognitive-developmental inquiry. *American Psychologist, 34,* 906-911.

Gagne, M., & Deci, E. (2005). Self-determination theory and work motivation. *Journal of Organizational Behavior, 26*; 331-362. DOI: 10.1002/job.322

Gagne´, M. (2003). The role of autonomy support and autonomy oritentaiton in prosocial behavior engagement. *Motivation and Emotion, 27(3),* 199-223. Doi: 0146-7239/03/0900-0199/0

Garcia, T., & Pintrich, P. R. (1996). Assessing students' motivation and learning strategies in the classroom context: The Motivated Strategies for Learning Questionnaire. In M. Birenbaum, & F. J. R. C. Dochy (Eds.), Alternatives in assessment of achievements, learning processes and prior knowledge (pp. 319–339). New York: Kluwer/Plenum.

Geurts, S., Rutte, C., & Peeters, M. (1999). Antecedents and consequences of work-home interference among medical residents. Social Science and Medicine, 48(9), 1135-1148. doi: S0277953698004250 [pii]

Grant, A. M. (2008). Does intrinsic motivation fuel the prosocial fire? Motivational synergy in predicting persistence, performance, and productivity. *Journal of Applied Psychology, 93,* 48-58. Doi: 10.1037/0021-9010.93.1.48

Greene, J. A., & Azevedo, R. (2007). A theoretical review of Winne and Hadwin's Model of self-regulated learning: New perspectives and directions. *Review of educational research, 77 (3),* 334-372.

Greene, J. A., & Azevedo, R. (2010). The measurement of learners' self-regulated cognitive and metacognitive processes while using computer-based learning environments. *Educational Psychologist,54(4),* 203-209. DOI: 10.1080/00461520.2010.515935

Guay, F., Boggiano, A., & Vallerand, R. (2001). Autonomy support, intrinsic motivation, and perceived competence: Conceptual and empirical linkages. *Presonality and social psychology Bulletin, 27 (6),* 643-650. Doi: 10.1177/0146167201276001

Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate data analysis*. (7th edition). Upper Saddle River, NJ: Prentice Hall

Hagger, M. S., Chatzisarantis, N. L., & Harris, J. (2006). From psychological need satisfaction to intentional behavior: testing a motivational sequence in two behavioral contexts. Pers Soc Psychol Bull, 32(2), 131-148. doi: 32/2/131 [pii] 10.1177/0146167205279905

Hayamizu, T. (1997). Between intrinsic and extrinsic motivation: Examination of reasons for academic study based on the theory of internalization. *Japanese Psychological Research, 39,* 98-108.

Hoffman, K. G., & Donaldson, J. F. (2004). Contextual tensions of the clinical environment and their influence on teaching and learning. *Medical Education, 38,* 448-454. DOI: 10.1046/j.1365-2933.2004.01799.x

Holmboe, E. S., Bowen, J. L., Green, M., Gregg, J., DiFrancesco, L., Reynolds, E., Alguire, P., Battinelli, D., Lucey, C., & Duffy, D. (2005). Reforming internal medicine residency training: A report from the Society of General Internal Medicine's Task Force for Residency Reform. *Journal of General Internal Medicine, 20,* 1165-1172. DOI: 10.1111/j.1525-1497.2005.0249.x.

Ilardi, B. C., Leone, D., Kasser, R., & Ryan, R. M. (1993). Employee and supervisor ratings of motivation: Main effects and discrepancies associated with job satisfaction and adjustment in a factory setting. *Journal of Applied Social Psychology, 23***,** 1789-1805

Jang, H., Reeve, J., Ryan, R., Kim, A. (2009). Can self-determination theory explain what underlines the productive, satisfying learning experiences of collectivistically oriented Korean students?. *Journal of educational psychology, 101(3),* 644-661.

Kitsantas, A., Winsler, A., & Huie, F. (2008). Self-regulation and ability predictors of academic success during college: A predictive validity study. *Journal of Advanced Academics, 20,* 42-68.

Kusurkar, R. A., Croiset, G., & Ten Cate, T. J. (2011). Twelve tips to stimulate intrinsic motivation in students through autonomy-supportive classroom teaching derived from self-determination theory. Med Teach, 33(12), 978-982. doi: 10.3109/0142159X.2011.599896

Kusurkar, R. A., Ten Cate, T. J., Vos, C. M., Westers, P., & Croiset, G. (2012). How motivation affects academic performance: A structural equation modelling analysis. Advances in Health Sciences Education Theory and Practice, *18*(3), 57-69. doi: 10.1007/s10459-012-9354-3

La Guardia, J. G., Ryan, R. M., Couchman, C. E., & Deci, E. L. (2000). Within-Person variation in security of attachment: A self-determination theory perspective on attachment, need fulfillment, and well-being. *Journal of Personality and Social Psychology, 79 (3),* 367-384. Doi: 10.1037//0022-3514.79.3.367

Lacasse, M., Lee, S., Ghavam-Rassoul, A., & Batty, H. (2009). Intergrating teaching into the busy resident schedule: A learner-centered approach to raise efficiency (L-CARE) in clinical teaching. *Medical Teacher, 31,* 507-315. DOI: 10.3109/0142159092842409.

Mann, K. V., Gordon, J., & MacLeod, A. (2009). Reflection and reflective practice in health professions education: a systematic review. *Advances in Health Science Education, 14,* 595-621. DOI: 10.1007/s10459-007-9090-2.

Mayer, B., Enstrom, M. K., Harstvein, M., Bowles, D. P., & Beevers, C. G. (2007). Happiness and despair on the catwalk: Need satisfaction, well-being, and personality adjuctoment among fashion models. *The Journal of Positive Psyhology, 2,* 2-17.

McCombs, B. L., (2008). Self-regulated learning and academic achievement: A phenomenological view. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement, Theoretical perspectives.* New York: Lawrence Erlbaum Associates.

Milyavskaya, M., & Koestner, R. (2011). Psychological needs, motivation, and well-being: A test of self-determination theory across multiple domains. *Personality and Individual Differences, 50*, 387-397. doi: 10.1016/j.paid.2010.10.029

Moreau, E., & Mageau, G. A. (2012). The importance of perceived autonomy support for the psychological health and work satisfaction of health professionals: Not only supervisors count, colleagues too!. *Motivation and Emotion, 36,* 268-286. doi: 10.1007/s11031-011-9250-9

Norman, G. R., & Streiner, D. L. (2003). Path analysis and structural equation modelling. In Norman, G. R., & Streiner, D. L. (Eds.), *PDQ statistics* (pp. 156-176). Hamilton, Canada: BC Decker Inc.

Ntoumanis, N. (2005). A prospective study of particpaiton in optional school physical education using a self-determinaiton theory framework. *Journal of Educational Psychology, 97 (3),* 444-453. DOI: 10.1037/0022-0663.97.3.444

Ozuah, P. O., Curtis, J., & Stein, R. E. K. (2001). Impact of problem-based learning on residents' self-directed learning. *Archives of Pediatrics and Adolescent Medicine, 155,* 669-672.

Patrick, H., Canevello, A., Knee, C., & Lonsbary, C. (2007). Role of need fulfillment in relationship functioning and well-being: A self-determination theory perspective. *Journal of Personality and Social Psychology, 92 (3),* 434-457. Doi: 10.1037/0022-3514.92.3.434

Pintrich, P . R. (1999). Motivational beliefs as resources for and constraints on conceptual change. In W . Schnotz, S. Vosniadou, & M. Carretero (Eds.), *New perspectives on conceptual change* (pp. 33–50). Amsterdam: Permagon.

Pintrich, P . R. (2000). The role of goal orientation in self-regulated learning. In M. Boekaerts, P. R. Pintrich, & M. Zeidner (Eds.), *Handbook of self-regulation* (pp. 451–502). San Diego, CA: Academic Press.

Pintrich, P . R., & De Groot, E. V . (1990). Motivational and self-regulated learning components of classroom academic performance. *Journal of Educational Psychology, 82*, 33–40.

Pintrich, P . R., Wolters, C. A., & Baxter, G. P . (1999). Assessing metacognitive and self-regulated learning. In G. Schraw, Issues in the measurement of metacognition: Proceeding from the Tenth Buros-Nebraska symposium on measurement and testing. Lincoln, NE: The University of Nebraska Press.

Pintrich, P. (1994). *Handbook of self-regulated learning*. San Francisco, CA: Jossey-Bass

Pintrich, P. R., Smith, D. A., Garcia, T., & McKeachie, W. J. (1993). Reliability and predictive validity of the Motivated Strategies for Learning Questionnaire (MSLQ). *Educational and psychological Measurement, 53,* 801-813.

Pintrich, P., & Schunk, D. (2002). Motivation in education: Theory, research, and applications (2nd ed.). Upper Saddle River, NJ: Merrill Prentice Hall.

Preacher, K. J., & Hayes, A. F. (2008). Asymptotic and resampling strategies for assessing and comparing indirect effects in multiple mediator models. *Behavior Research Methods, 40*, 879-891.

Puustinen, M., & Pulkkinen, L. (2001). Models of self-regulated learning: A review. *Scandinavian Journal of Educational Research, 45*, 269–286.

Reeve, J. (2002). Self-determination theory applied to educational settings. In: Deci, E. L., Ryan, R. M. (Eds.), *Handbook of self-determination research*. Rochester, NY: University of Rochester Press. Pp183-203.

Reeve, J., Deci, E. L., & Ryan, R. M. (2004). Self-determination theory: A dialectical framework for understanding the sociocultural influences on student motivation. In D. McInerney & S. Van Etten (Eds.), *Research on sociocultural influences on motivation and learning: Big theory revisited* (Vol. 4, pp. 31-59). Greenwich, CT: Information Age Press.

Reeve, J., Ryan, R., Deci, E., & Jang, H. (2008). Understanding and promoting autonomous self-regulation: A self-determination theory perspective. In D. H. Schunk & B. J. Zimmerman (Eds.), *Motivation and Self-Regulated Learning: Theory, Research, and Application.* New York: Lawrence Erlbaum Associates.

Reis, H., Sheldon, K., Gable, S., Roscoe, J., & Ryan, R. (2000). Daily well-being: The role of autonomy, competence, and relatedness. *Personality and social Psychology Bulletin, 26,* 419-435.

Ryan, R. M. (1995). Psychological needs and the facilitation of integrative processes. *Journal of Personality, 63,* 397-427.

Ryan, R. M., & Deci, E. L. (2002). An overview of self-determination theory: An Organismic-dialectical perspective. In E. L. Deci & R. M. Ryan (Eds.). *Handbook of self-determination Research (*pp. 3-33). Rochester, NY: University of Rochester Press.

Ryan, R. M., & Deci, E. L. (2006). Self-regulation and the problem of human autonomy: Does psychology need choice, self-determination, and will? *Journal of Personality, 74 (6),*1557-1586. DOI: 10.1111/j.1467-6494.2006.00420.x

Ryan, R.M., Deci, E.L. (2000a). Intrinsic and extrinsic motivations: Classic definitions and new directions. *Contemporary Educational Psychology*, *25*, 54-67. doi:10.1006/ceps.1999.1020

Ryan, R.M., Deci, E.L. (2000b). Self-determination theory and facilitation of intrinsic motivation, social development and well-being. *American Psychology, 55(1),* 68-78.

Salamonson, Y., Everett, B., Koch, J., Wilson, I., Davidson, P. M. (2009). Learning strategies of first year nursing and medical students: A comparative study. *International Journal of Nursing Studies, 46,* 1541-1547. doi: 10.1016/j.ijmurstu.2009.05.010

Sandars, J., & Cleary, T. J. (2011). Self-regulation theory: Applications to medical education: AMEE guide No.58. *Medical Teacher, 33,* 875-886. Doi: 10.3109/0142159X.2011.595434

Schunk, D. H. (2008). Social cognitive theory and self-regulated learning. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement, Theoretical perspectives.* New York: Lawrence Erlbaum Associates.

Schunk, D. H., & Schwartz, C. W. (1993). Goals and progress feedback: Effects on self-efficacy and writing achievement. *Contemporary Educational Psychology, 18(3),* 337-354.

Schunk, D. H., & Zimmerman, B. J. (2008). *Motivation and self-regulated learning: Theory, research, and applications*. New York: Lawrence Erlbaum Associates.

Schunk, D. H., & Zimmerman, B. J., (1998). *Self-Regulated Learning: From teaching to self-reflective practice.* New York: Guilford.

Seligman, M. (1975). *Helplessness: On depression, development, and death.* San Francisco: W. H. Freeman.

Senko, C., & Harackiewicz, J. M. (2005). Regulation of achievement goals: The role of competence feedback. *Journal of Educational Psychology, 97*, 320-336.

Sheldon, K. M. & Niemiec, C. P. (2006). It's not just the amount that count: Balanced need satisfaction also affect well-being. *Journal of Personality and Social Psychology, 91 (2),* 331-341. Doi: 10.1037/0022-3514.91.2.331

Sierens, E., Vansteenkiste, M., Goossens, L., Soenens, B., & Dochy, F. (2009). The synergistic relationship of perceived autonomy support and structure in the prediction of self-regulated leanring. *British Journal of Educational Psychology, 79,* 57-68. doi: 10.1348/000709908X304398

Sobral, D.T. (2004). What kind of motivation drives medical students' learning quests?. *Medical Education*, *38*, 950-957.

Stegers-Jager, K. M., Cohen-Schotanus, J., & Themmen, A. P. (2012). Motivation, learning strategies, participation and medical school performance. *Medical Educaiton, 46*, 678-688. doi: 10.1111/j.1365-2923.2012.04284.x

Stok-Koch, L., Bolhuis, S., & Koopmans, R. (2007). Identifying factors that influence workplace learning in postgraduate medical education. *Education for Health, 20,* 1-9.

Symeon P., Michailidou V., & Michailidou, S. (2006). Development and Initial Validation of a Measure of Autonomy, Competence, and Relatedness in Exercise: The Basic Psychological Needs in Exercise Scale. *Measurement in Physical Education and Exercise Science; 10 (3)*; 179-201, DOI: 10.1207/s15327841mpee1003_4

Ten Cate, T. J., Kusurkar, R. A., & Williams, G. C. (2011). How self-determination theory can assist our understanding of the teaching and learning processes in medical education. AMEE guide No. 59. Med Teach, 33(12), 961-973. doi: 10.3109/0142159X.2011.595435

Thogersen-Ntouman, C., & Ntoumanis, N. (2007). A self-determination theory approach to the study of body image concerns, self-presentation and self-perception in a sample of aerobic instructors. *Journal of Health Psychology, 12,* 301-315.

Turan, S., & Konan, A. (2012). Self-Regulated learning strategies used in surgical clerkship and the relationship with clinical achievement. *Journal of Surgical Education, 69*(2), 218-225. doi:10.1016/ j.jsurg.2011.09.003

Turan, S., Demirel, O., & Sayek, I. (2009). Metacognitive awareness and self-regulated learning skills of medical students in different medical curricula. *Medical Teacher,31,* e477-e483. doi: 10.3109/01421590903193521

Vallerand, R.J., Pelletier, L.G., Blais, M.R., Brière, N.M., Senecal, C., & Vallieres, E. F. (1992). The academic motivation scale: A measure of intrinsic, extrinsic and amotivation in education. *Educational and Psychological Measurement, 52,* 1003-1071. doi:10.1177/0013164492052004025

Vallerand, R.J., Pelletier, L.G., Blais, M.R., Brière, N.M., Senecal, C., & Vallieres, E. F. (1993). On the assessment of intrinsic, extrinsic and amotivation in education: Evidence on

concurrent and construct validity of the Academic Motivation Scale. *Educational and Psychological Measurement, 53,* 159-172. doi: 10.1177/0013164493053

Vallerand, R. J., Fortier, M. S., & Guay, F., (1997). Self-determination and persistence in a real-life setting: Toward a motivational model of high school dropout. *Journal of Personality and Social Psychology, 72,* 1161-1176.

Vansteenkiste, M., Simons, J., Lens, W., Sheldon, K. M., & Deci, E. L. (2004). Motivation learning , performance, and persistence: The synergistic role of intrinsic goals and autonomy-support. *Journal of Personality and Social Psychology, 87.* 246-260.

Wei, M., Philip, A. S., Shaffer, A., Young, S. K., & Zakalik, R. A. (2005). Adult attachment, shame, depression, and loneliness: The medication role of basic psychological needs satisfaction. *Journal of Counseling Psychology, 52*, 591-601.

Wei, M., Shaffer, P. A., Young, S. K., & Zakalik, R. A. (2005). Adult attachment, shame, depression, and loneliness: The mediation role of basic psychological needs satisfaction. *Journal of Counselling Psychology, 52 (4),* 591-601. Doi: 10.1037/0022-0167.52.4.591

Weinstein, C. E., & Mayer, R. E. (1986). The teaching of learning strategies. In M. C. Wittrock (Ed.), *Handbook of research on teaching* (pp. 315-327). New York: Macmillan.

White, C. B. (2007). Smoothing out transitions: how pedagogy influences medical students' achievement of self-regulated learning goals. *Advances in health sciences education, 12,* 279-297. doi: 10.1007/s10459-006-9000-z

White, C. B., & Fantone, J. C. (2010). Pass-fail grading: laying the foundation for self-regulated learning. *Advances in Health Science Education, 15,* 469-477. DOI: 10.1007/s10459-009-9211-1.

White, C. B., & Gruppen, L. D. (2010). Self-Regulated Learning in Medical Education, in Understanding Medical Education: Evidence, Theory and Practice (Ed T. Swanwick), Wiley-Blackwell, Oxford, UK. Doi: 10.1002/9781444320282.ch19

Wiel, M. W., Bossche, P. V., Janssen, S., & Jossberger, H. (2011). Exploring deliberate practice in medicine: how do physicians learn in the workplace?. *Advances in Health Science Education, 16,* 81-95. DOI: 10.1007/s10459-010-9246-3.

Williams, G. C., & Deci, E. L. (1996). Internalization of biopsychosocial values by medical students: A test of self-determination theory. *Journal of Personality and Social Psychology, 70,* 767-779.

Williams, G. C., McGregor, H. A., Zeldman, A., Freedman, Z. R., & Deci, E. L. (2004). Testing a self-determination theory process model for promoting glycemic control through diabetes self-management. *Health Psychology, 23*, 58-66.

Winne, P. H. (2005). A perspective on state-of-the-art research on self-regulated learning. *Instructional Science, 33,* 559-565. doi:10.1007/s11251-005-1280-9

Winne, P. H., & Hadwin, A. F. (2008). The weave of motivation and self-regulated learning. In D., Schunk, & B., Zimmerman (Eds), *Motivation and self-regulated learning: Theory, research and applications* (pp.297-314). NY: Taylor & Francis.

Winne, P. H., Jamieson-Noel, D. L., & Muis, K. R. (2002). Methodological issues and advances in researching tactics, strategies, and self-regulated learning. In P.R. Pintrich & M. L. Maehr (Eds.), *Advances in motivation and achievement: New directions in measures and methods*. (Vol. 12, pp. 121-155). Greenwich, CT: JAI Press.

Winne, P.,&Marx, R. (1989).A cognitive-processing analysis of motivation with classroom tasks. In C. Ames & R. Ames (Eds.), Research on motivation in education (Vol. 3, pp. 223–257). Orlando, FL: Academic.

Wolters, C. A. (2010). Regulation of motivation: Evaluating an underemphasized aspect of self-regulated learning. Educational Psychologist; *38 (4)*; 189-205, DOI: 10.1207/S15326985EP3804_1

Wood, N. N., Mylopoulos, M., & Brydges, R. (2011). Informal self-regulated learning on a surgical rotation: uncovering student experiences in context. *Advances in Health Science Education, 16,* 643-653. doi: 10.1007/s10459-011-9285-4

Wyatt, J. C., & Sullivan, F. (2005). ABC of health informatics: Keeping up learning in the workplace. *BMJ, 331,* 1129 - 1132.

Yamauchi, H., & Tanaka, K. (1998). Relations of autonomy, self-referenced beliefs, and self-regulated learning among Japanese children. *Psychological Reports, 82,* 803-816.

Zimmerman, B. J. (1990). Self-regulated learning and academic achievement: An overview. *Educational Psychologist, 21,* 3-18.

Zimmerman, B. J. (1998). Academic studying and the development of per-sonal skill: A self-regulatory perspective. *Educational Psychologist, 33*, 73–86.

Zimmerman, B. J. (2000). Attaining self-regulation. A social cognitive per-spective. In M. Boekaerts, P . R. Pintrich, & M. Zeidner (Eds.), *Handbook of self–regulation* (pp. 13–39). San Diego, CA: Academic Press.

Zimmerman, B. J. (2004). Sociocultural influence and students' development of academic self-regulation: A social-cognitive perspective. In D. McInerney & S. Van Etten (Eds.),

Research on sociocultural influences on motivation and learning: Big theory revisited (Vol. 4, pp. 139-164). Greenwich, CT: Information Age Press.

Zimmerman, B. J. (2008). Theories of self-regulated learning and academic achievement: An overview and analysis. In B. J. Zimmerman & D. H. Schunk (Eds.), *Self-regulated learning and academic achievement, Theoretical perspectives.* New York: Lawrence Erlbaum Associates.

Zimmerman, B. J., & Martinez-Pons, M. (1986). Development of a structured interview for assessing students' use of self-regulated learning strategies. *American Educational Research Journal, 23, 614*-628.

Zimmerman, B. J., & Martinez-Pons, M. (1988). Construct validation of a strategy model of student self-regulated learning. *Journal of Educational Psychology, 80,* 284-290.

Zimmerman, B. J., & Paulsen, A. S. (1995). Self-monitoring during collegiate studying: An invaluable tool for academic self-regulation. In P. Pintrich (Ed.), *New directions in college teaching and learning: Understanding self-regulated learning* (No. 63, Fall, pp. 13-27). San Francisco, CA: Jossey-Bass.

Zimmerman, B. J., & Schunk, D. H. (2008). Motivation: An essential dimension of self-regulated learning. In D. H. Schunk, & B. J. Zimmerman (Eds.), *Motivation and self-regulated learning: Theory, research, and applications* (pp. 1-30). New York: Lawrence Erlbaum Associates.

Zimmerman, B. J., (1995). Self-Regulation involves more that metacognition: A social cognitive perspective. *Educational Psychologist, 29,* 217-221.

Zimmerman, B. J., (1998). Developing self-fulfilling cycles of academic regulation: An analysis of exemplary instructional models. In D. H. Schunk & B. J. Zimmerman (Eds.), *Self-*

regulated learning: From teaching to self-reflective practice (pp. 1-19). New York: Guilford.

Zimmerman, B. J., Bandura, A., & Martinez-Pons, M. (1992). Self-motivation for academic attainment: The role of self-efficacy beliefs and personal goal setting. *American Educational Research Journal, 29,* 663-676.

APPENDIX 1: QUESTIONNAIRE

Age:

Sex:

Post-graduate year (PGY):

Department:

Have you ever studied in a problem based learning (PBL) system? YES NO

The following questions are in regards to your feelings during this rotation (if you have been in this rotation for less than 3 weeks, please answer the questions regarding your previous rotation). Please indicate how true each of the following statements is for you given your experiences on this rotation. Remember, there is no right or wrong answer. Just answer as accurately as is possible for you.

Please use the following scale (from 1 to 7) in responding to the items (1= not at all true, 4= somewhat true, 7= very true).

	Not at all true foe me			Somewhat true for me			Very true for me
3. I do not feel very competent when I am at work.	1	2	3	4	5	6	7
4. People at work tell me I am good at what I do.	1	2	3	4	5	6	7
5. I feel pressured at work.	1	2	3	4	5	6	7
6. I get along with people at work.	1	2	3	4	5	6	7
8. I am free to express my ideas and opinions on the job.	1	2	3	4	5	6	7
10. I have been able to learn interesting new skills on my job.	1	2	3	4	5	6	7
11. When I am at work, I have to do what I am told.	1	2	3	4	5	6	7
12. Most days I feel a sense of accomplishment from working.	1	2	3	4	5	6	7

13. My feelings are taken into consideration at work.	1	2	3	4	5	6	7
14. I do not get much of a chance to show how capable I am at work.	1	2	3	4	5	6	7
15. People at work care about me.	1	2	3	4	5	6	7
16. There are not many people at work that I am close to.	1	2	3	4	5	6	7
18. The people I work with do not seem to like me much.	1	2	3	4	5	6	7
20. There is not much opportunity for me to decide for myself how to go about my work.	1	2	3	4	5	6	7
21. People at work are pretty friendly towards me.	1	2	3	4	5	6	7

Autonomy: 5R, 8, 11R, 13, 20R.

Competence: 3R, 4, 10, 12, 14R.

Relatedness: 6, 15, 16R, 18R, 21.

Note: items are numerated as in the original full questionnaire.

(R = reversed scoring).

Academic Motivation Scale.

Using the scale below, indicate to what extent each of the following items presently corresponds to one of the reasons why you join a residency program.

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

1. Because with only a bachelor medical degree I would not find a high-paying job later on.
2. Because I experience pleasure and satisfaction while learning new things.
3. Because I think that a residency will help me better prepare for the career I have chosen.
4. For the intense feelings I experience when I am communicating my own ideas to others.
5. Honestly, I don't know; I really feel that I am wasting my time in this residency program.
6. For the pleasure I experience while surpassing myself in my studies/work.
7. To prove to myself that I am capable of completing my residency program.
8. In order to obtain a more prestigious job later on.
9. For the pleasure I experience when I discover new things I've never known before.
10. Because eventually it will enable me to work in a field that I like.
11. For the pleasure that I experience when I read about interesting cases.

12. I once had good reasons for joining a residency program; however, now I wonder whether I should continue.

13. For the pleasure that I experience while I am surpassing myself in one of my personal accomplishments.

14. Because of the fact that when I succeed in residency I feel important.

15. Because I want to have "the good life" later on.

16. For the pleasure that I experience in broadening my knowledge about subjects which appeal to me.

17. Because this will help me make a better choice regarding my career orientation.

18. For the pleasure that I experience when I feel completely absorbed by what certain authors have written.

19. I can't see why I go to study/work and frankly, I couldn't care less.

20. For the satisfaction I feel when I am in the process of accomplishing difficult academic activities.

21. To show myself that I am an intelligent person.

22. In order to have a better salary later on.

23. Because residency allows me to continue to learn about many things that interest me.

24. Because I believe that a few additional years of training will improve my competence as a physician.

25. For the "high" feeling that I experience while reading about various interesting subjects.

26. I don't know; I can't understand what I am doing in this residency program.

27. Because residency allows me to experience a personal satisfaction in my quest for excellence in my career.

28. Because I want to show myself that I can succeed in my career.

KEY FOR AMS-28

# 2, 9, 16, 23	Intrinsic motivation - to know
# 6, 13, 20, 27	Intrinsic motivation - toward accomplishment
# 4, 11, 18, 25	Intrinsic motivation - to experience stimulation
# 3, 10, 17, 24	Extrinsic motivation - identified
# 7, 14, 21, 28	Extrinsic motivation - introjected
# 1, 8, 15, 22	Extrinsic motivation - external regulation
# 5, 12, 19, 26	Amotivation

MSLQ

The following questions are related to your study habits in your current rotation.

Remember, there is no right or wrong answer. Just answer as accurately as possible for you. Use the scale below to answer the questions.

If you think the statement is very true of you, circle 7.

If a statement is not at all true of you, circle 1.

If the statement is more or less true of you, circle the number between 1 and 7 that is most appropriate for you.

	Not at all true foe me						Very true for me
32. When I study the readings for this rotation, I outline the material to help me organize my thoughts.	1	2	3	4	5	6	7
34. When studying for this rotation, I often try to explain the material to a colleague or a friend.	1	2	3	4	5	6	7
37. I often feel so lazy or bored when I study for this rotation that I quit before I finish what I planned to do.	1	2	3	4	5	6	7
38. I often find myself questioning things I hear or read during this rotation to decide if I find them convincing.	1	2	3	4	5	6	7
40. Even if I have trouble learning the material in this rotation, I try to do the work on my own, without help from anyone.	1	2	3	4	5	6	7
42. When I study for this rotation, I go through the readings and my notes	1	2	3	4	5	6	7

and try to find the most important ideas.							
43. I make good use of my study time for this rotation.	1	2	3	4	5	6	7
44. If the reading materials are difficult to understand, I change the way I read the material.	1	2	3	4	5	6	7
45. I try to work with other colleagues from this rotation to complete the educational assignments (e.g., preparation for presentations or discussions).	1	2	3	4	5	6	7
46. When studying for this rotation, I read the reading materials over and over again.	1	2	3	4	5	6	7
47. When a theory, interpretation, or conclusion is presented in a teaching session or in the readings, I try to decide if there is good supporting evidence.	1	2	3	4	5	6	7
48. I work hard to do well in this rotation even if I don't like what we are doing.	1	2	3	4	5	6	7
49. I make simple charts, diagrams, or tables to help me organize reading material.	1	2	3	4	5	6	7
50. When studying for this rotation, I often set aside time to discuss the reading material with a group of colleagues from the rotation.	1	2	3	4	5	6	7
51. I treat the reading material as a starting point and try to develop my own ideas about it.	1	2	3	4	5	6	7
54. Before I study the reading material (e.g., textbooks, articles) thoroughly, I often skim it to see how it is organized.	1	2	3	4	5	6	7
55. I ask myself questions to make sure I understand the material I have been studying in this rotation.	1	2	3	4	5	6	7

57. I often find that although I have been reading for the rotation, I don't know what it was all about.	1	2	3	4	5	6	7
58. I ask the staff to clarify concepts I don't understand well.	1	2	3	4	5	6	7
59. I memorize key words to remind me of important concepts in this rotation.	1	2	3	4	5	6	7
60. When reading material is difficult, I give up or only study the easy parts.	1	2	3	4	5	6	7
62. I try to relate ideas in this rotation to those in other rotations whenever possible.	1	2	3	4	5	6	7
64. When reading for this rotation, I try to relate the material to what I already know.	1	2	3	4	5	6	7
67. When studying for this rotation, I write brief summaries of the main ideas from the readings and the concepts from the sessions.	1	2	3	4	5	6	7
68. When I can't understand the material in this rotation, I ask another colleague in this rotation for help.	1	2	3	4	5	6	7
72. I make lists of important ideas for this rotation and memorize the lists.	1	2	3	4	5	6	7
73. I attend educational sessions regularly.	1	2	3	4	5	6	7
77. I often find that I don't spend very much time studying for this rotation because of other activities.	1	2	3	4	5	6	7
78. When I study for this rotation, I set goals for myself in order to direct my activities.	1	2	3	4	5	6	7

Note: The basic psychological needs scale and the MSLQ items are numerated as in the original full questionnaires. (R = reversed scoring).

Cognitive and metacognitive strategies: Rehearsal 46, 59, 72.

Cognitive and metacognitive strategies: Elaboration 62, 64, 67.

Cognitive and metacognitive strategies: Organization 32, 42, 49.

Cognitive and metacognitive strategies: Critical thinking 38, 47, 51.

Cognitive and metacognitive strategies: Metacognitive self-regulation 44, 54, 55, 57R, 78.

Resource management strategies: Time and study environment 43, 73, 77R.

Resource management strategies: Effort regulation 37R, 48, 60R.

Resource management strategies: Help seeking 40R, 58, 68.

Resource management strategies: Peer learning 34, 45, 50.

Appendix 2: Ethical Board Approval

McGill

Faculty of Medicine
3655 Promenade Sir William Osler #633
Montreal, QC H3G 1Y6

Faculté de médecine
3655, Promenade Sir William Osler #633
Montréal, QC H3G 1Y6

Fax/Telecopieur (514) 398-3870
Tel/Tel. (514) 398-3124

January 6, 2014

Dr. Michelle Elizov
Centre for Medical Education
1110 Pine Avenue West - #205
Montreal, Quebec H3A 1A3

RE: IRB Study Number A01-E05-14A
Relations between psychological needs satisfaction, motivation, and self-regulated learning strategies in medical residents

Dear Dr. Elizov,

Thank you for submitting the above study for IRB review, on behalf of the Masters student, Dr. Fareeda Mukhtar.

As this study involves no more than minimal risk, and in accordance with Articles 2.9 and 6.12 of the 2nd Edition of the Canadian Tri-Council Policy Statement of Ethical Conduct for Research Involving Humans (TCPS 2) and U.S. Title 45 CFR 46, Section 110 (b), paragraph (1), we are pleased to inform you that approval for the study, study instruments and consent form (December 2013) was provided by the IRB Chair on January 6, 2014, valid until **January 2015**. The study proposal will be presented for corroborative approval at the next meeting of the Committee and a certification document will be issued to you at that time.

A review of all research involving human subjects is required on an annual basis in accord with the date of initial approval. The annual review should be submitted at least one month before **January 2015**. Please inform the IRB promply of any modifications that may occur to the study over the next twelve months.

Sincerely,

Roberta Palmour, PhD
Chair
Institutional Review Board

cc: Dr. Fareeda Mukhtar
A01-E05-14A

APPENDIX 3: EMAIL TO PROGRAM DIRECTORS

Dear Dr. X,

My name is Fareeda Mukhtar, currently pursuing a Master's degree in educational psychology - Health profession stream at McGill under the supervision of Dr. Krista Muis and Dr. Michelle Elizov. We are conducting research to study McGill residents' motivation and learning strategies. Our aim is to enrich the medical education literature by illustrating the effects of residents' working environment on their motivation to learn and on their learning strategies. This will be an essential step towards guiding educators and researchers to help residents better utilize their learning strategies, which will subsequently be reflected on their clinical performance. The questionnaire will take about 20 minutes to complete. Residents' participation is completely voluntary, refusal to participate will have no negative impact, and all data will be kept strictly confidential and anonymous. No identification information will be collected. Only investigators will have access to the data. The study has received McGill Ethical Board approval (Number). If you approve the participation of your residents in this study, please allow me to foreword the following email to residents.

Best regards,

Fareeda Mukhtar, M.D.

MA- Educational Psychology, Health Profession Stream.

Center of Medical Education, McGill University.

Email: Fareeda.Mukhtar@mail.mcgill.ca

APPENDIX 4: EMAIL TO RESIDENTS

Dear Residents,

My name is Fareeda Mukhtar, currently pursuing a Master's degree in educational psychology - Health profession stream at McGill under supervision of Dr. Krista Muis and Dr. Michelle Elizov. You are invited to participate in an online-survey addressed to residents at McGill University titled "Relations between Psychological Needs Satisfaction, Motivation, and Self-Regulated Learning Strategies in Medical Residents." Our aim is to study residents' satisfaction at work, their motivation, and their learning strategies. This will help medical educators to understand the effect of residents' working environment on residents' use of learning strategies. The study has received McGill Ethics Board approval. We also have received support from your program director to send you this email. Your participation is greatly appreciated and any information you provide will be strictly confidential. Upon completing the questionnaire, you will be given an opportunity to enter a draw on one of eight $25 gift cards, corresponding to a chance of winning of 4%-5%.

Please click on the link below to participate.

Best Regards,

Fareeda Mukhtar, M.D.

MA- Educational Psychology, Health Profession Stream.

Center of Medical Education, McGill University.

Email: Fareeda.Mukhtar@mail.mcgill.ca

Appendix 5: Consent Form for McGill Residents

Relations between Psychological Needs Satisfaction, Motivation, and Self-Regulated Learning Strategies in Medical Residents

Project Leader:

Fareeda Mukhtar.
Masters student, Educational Psychology- Health profession stream, McGill University
Tel: 514-654-0410.
Fareeda.Mukhtar@mail.mcgill.ca

Supervisors:

Dr. Krista Muis
Associate professor, Department of Educational psychology, McGill University.
Tel: 514-398-3445
Krista.Muis@mcgill.ca

Dr. Michelle Elizov,
Assistant professor, Department of Medicine, McGill university
Tel: 514-340-8222, loc 4974
Michelle.Elizov@mcgill.ca

Dear resident,

You are invited to participate in an online-survey addressed to residents at McGill University titled "Relations between Psychological Needs Satisfaction, Motivation, and Self-Regulated Learning Strategies in Medical Residents." Our aim is to study residents' satisfaction at work, their motivation, and their learning strategies. This will help medical educators to understand the effect of residents' working environment on residents' use of learning strategies

Study Procedure:

Prior to participating in the online questionnaire, please read the consent form and click on "I agree" button in order to be redirected to the online questionnaire.

The study is composed of an online survey that will take approximately 20 minutes to complete. The survey consists of three sections:

1. Your demographic characteristics (e.g., department, post-graduate year, age, sex).
2. Your perceived psychological satisfaction at work during your current rotation.
3. Your motivation to learn during your current rotation.
4. Your reported use of different learning strategies (e.g., asking questions about unclear information while reading for the rotation, managing your time to read and study) during your current rotation.

Possible risk and discomfort:

There is no known risk or harm for residents who participate in the study.

Potential benefits:

There is no direct benefit from participation in this study.

Cost and reimbursement:

There is no cost associated with your participation. Upon completing the survey, you will be directed to a separate page where you can leave your McGill email to enter a draw for one of eight $25 gift cards, which corresponds to a 4% to 5% chance of winning depending on the total number of participants. This is an optional step and your email will not be linked to your responses on the survey in any way.

Confidentiality:

All information obtained from this survey will be kept strictly confidential and will not be made available to individuals, staff, or program directors. Your individual responses will be confidential and will not be identifiable. If you wish to enter the draw, your email address will not be linked to your responses in any way. Your email address will be kept confidential and will

not be used except to contact the winners of the draw, and then all email addresses will be deleted. Only authorized members of the research team will have access to your responses. The results of the study will be used to inform my Master's thesis and, as such, may be presented and/or published. In any presentation or publication, only analyzed data will be presented. No identification information will be disclosed when results are published. Data will be kept for up to 7 years after completion of analysis and then will be completely destroyed.

Voluntary participation and/or withdrawal:

Your participation in this survey is completely voluntary. You may refuse to participate or to continue the questionnaire at any time without explanation or penalty. There are no consequences should you decide not to participate or if you discontinue your participation before submitting your responses. Due to the anonymous nature of participation, you will not be able to withdraw from the study once all completed responses are submitted.

Questions and contact information:

This project has received approval from the McGill Faculty of Medicine Institutional Review Board. It has also received support from your program director. If you have any questions about your rights as a research participant, please contact Ilde Lepore, Senior Ethics Administrator of the Institutional Review Board at 514-398-8302. If you have any questions about the research itself or to report any adverse event, you may contact Dr. Fareeda Mukhtar at 514-654-0410 or by email: Fareeda.Mukhtar@mail.mcgill.ca

Declaration of consent

I have read this consent form and understand and agree to the following information:

- My participation in this study is voluntary. I am free to withdraw my consent and to discontinue my participation in the study without explanation or penalty.

- My decision regarding whether or not to participate will have no effect on my status at McGill University. There are no penalties or loss of benefits associated with a refusal to participate in this study.
- The results of the study will be used in research publications and/or presentations.
- Confidentiality of any verbal and/or written feedback I provide will be respected, as all information will be coded and my name and/or contact information will not appear in any published documents.
- I have had the opportunity to ask questions, and all of my questions have been answered to my satisfaction.
- I have been given sufficient time to consider the information and seek advice should I choose to do so.
- I understand that if I choose to participate in the draw for one of eight $25 gift cards, the contact information I provide will not be linked to my responses in any way, will not be disclosed to any person except the researchers, will be used to contact me if I win, will be kept confidential, and will be completely destroyed after the winners have been contacted.

By clicking on the “I agree button” below, I agree to participate in this survey. I recognize that by doing so, I do not give up any of my legal rights.

☐ I agree to participate.

☐ I do not agree to participate.