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Promoting Implementation of Clinical Learning Tools for Optimal Goal Orientation and Self-Regulated Learning Skills in Clinical Medical Students

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Abstract

Promoting Implementation of Clinical Learning Tools for Optimal Goal Orientation and Self-Regulated Learning Skills in Clinical Medical Students

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One goal of medical education is that students become motivated, life-long learners and are prepared to enter into clinical practice as effective self-regulated learners. A goal of clinical teaching faculty is to promote a conducive environment that fosters mastery goal orientations and self-regulated learning (SRL) s trategies. However, clinical faculty face many barriers to effective teaching. Teaching tools such as SNAPPS and the One-Minute Preceptor (OMP) c an provide a means for physicians to foster motivation and SRL skills despite barriers to teaching.

Achievement Goal Orientation Theory and Self-Regulated Learning will be reviewed as constructs to utilize in clinical medical education. SNAPPS and OMP will be reviewed as tools that promote mastery goal orientation, mastery goal structures, and self-regulation. Ideal implementation of teaching and learning tools by faculty as well as habit development for utilizing tools in clinical practice will be evaluated.

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Statement of the Problem

To be a great physician one must be a motivated, lifelong learner. Science and medicine are constantly changing, and what a physician knows at one time will not be sufficient for future practice (Cutrer et al., 2017). The current pandemic is a fitting example where physicians must have the motivation and skills to constantly be learning about the novel coronavirus, the effects of COVID-19 on patients, and altering management of patients according to new evidence, resources available, and experienced practice.

Motivation and lifelong learning skills must be supported in medical education for future and practicing physicians to be able to continue to do their job well. In particular, being motivated requires that learners have the right goal orientation: that they are focused on mastering and understanding new knowledge in a deep way (i.e., mastery goals), rather than simply trying to demonstrate competence and look good compared to one's peers (i.e., performance-approach goals) or to avoid looking bad compared to one's peers (i.e., performance-avoidance goals). Beyond being motivated, effective learners are also self-regulated in reaching their learning goals. Self-regulation includes both cognitive processes (using effective learning strategies) and metacognitive processes (monitoring and reflecting on progress) (Cho et al., 2017).

In this present paper, I will describe why motivation (in terms of achievement goals) and self-regulated learning are important, and how they are fostered in medical training. In particular, while these skills are often explicitly built into pre-clinical training, they are often neglected in clinical training. I make suggestions about how patient rounds can serve as an important training

ground for fostering motivation and self-regulation and how simple tools like One-Minute Preceptor (OMP) and SNAPPS can be adapted to do so.

Achievement Goal Orientation Theory

Each time students initiate a learning task they have certain goals in mind that drive their learning process. Researchers are interested in these goals in order to better understand what motivates students to learn and to understand which goals may produce optimal learning outcomes. Achievement goal orientation is a theory used by researchers to categorize learning goals based on student motivation.

The theory focuses on understanding what purposes influence students to engage in a learning task (Senko, 2016; Kool et al., 2016). Fundamental to the theory are mastery and performance goals, which illustrate different reasons students attend to a task. A student with a mastery orientation focuses on developing competence by learning as much as possible, while a student with a performance orientation focuses on demonstrating competence to others. Performance goals are further characterized by approach or avoidance orientations. Performance approach involves tackling tasks to do better than others or demonstrate ability to others while performance avoidance involves doing a task to avoid looking incompetent (Senko, 2016).

A mastery orientation is associated with many ideal learning outcomes including: interest in subject matter, persistence during obstacles, self-regulated learning, the use of deep processing strategies, psychosocial abilities, and long-term retention of information (Butler & Neuman, 1995; Dupeyrat & Marine, 2005; Harackiewicz et al., 1997; Madjar, Bachner, & Kushnir, 2012; Pintrich & Groot, 1990; Simons, Dewitte, & Lens, 2004; Utman, 1997). While in some studies a performance-approach orientation has emphasized increased achievement in comparison to mastery orientation this is also associated with shallow processing strategies, procrastination, avoidance-of-help-seeking behaviors and low frustration tolerance (Artino et al., 2012; Madjar, Bachner, & Kushnir, 2012; Senko, Hulleman, & Harackiewicz, 2011).

There are times in medical education where a performance approach orientation likely benefits students, such as during studying for highly competitive standardized tests such as licensing exams. However, as students approach a career of clinical practice we prefer qualities and learning techniques associated with a mastery approach orientation to dominate. The associated benefits of mastery approach orientation, such as applying deep learning strategies to new clinical problems and persisting through challenges, prepares students to become physicians that apply their current knowledge and skills as well as continually develop knowledge and skills to provide great care for their patients.

Why it is Important in Clinical Medical Education

Achievement goal orientation theory is important to study during clinical medical education to understand how certain goal orientations in clinical settings impact student approaches to learning. Medical schools are focused on producing physicians with key competencies including medical knowledge, practice-based learning and improvement, interpersonal and communication skills, professionalism, and systems-based practice (*ACGME Core Competencies*). It is easy to see that learning outcomes associated with a mastery approach orientation as discussed above foster the development of these competencies. For example, a learner with a mastery approach orientation will seek to learn as much as possible and persist through clinical challenges as is key for medical knowledge and practice-based learning and improvement competencies. The learner will also be driven to provide the best patient care rather than compete with others, preparing them for competencies in interpersonal and communication skills and professionalism. As they encounter system-wide problems in our healthcare system they may use deep learning strategies to provide novel solutions. Therefore the importance of assessing goal orientations and promoting adaptable mastery learning outcomes rather than

surface level learning, procrastination, and avoidance-of-help-seeking behavior is important in the clinical setting (Artino et al., 2012; Senko, Hulleman, & Harackiewicz, 2011).

The theory also focuses on understanding students' experience during challenges and setbacks (Senko, 2016). Therefore, this theory functions as a valuable construct to identify student motivation during the numerous challenges associated with medical school and particularly, as students enter the clinical environment and must balance care of patients, studying for end of clerkship exams, and preparation for the national STEP 1 Exam. Furthermore, students are novices as they enter the clinical environment. Though they have experienced years of didactic training in undergraduate and preclinical courses they have yet to establish the basic skills of taking care of patients in a clinic or hospital setting.

Achievement goal orientation theory recognizes that motivation dominated by performance approach and avoidance orientation are particularly detrimental to novice students with resultant learning involving unsystematic approaches (Seijts & Latham, 2001). For all these reasons, it is important to understand how achievement goal orientations in clinical education promote mastery approach orientations in students.

Factors Influencing Achievement Goal Orientation

The literature often treats achievement goals as a relatively stable between-subjects factor (Kool et al., 2016; Senko, 2016). Most studies are conducted by surveying students' achievement goals at a single time point (Senko, 2016). Some of the stable factors influencing goal orientations include students' perfectionism, fear of failure, and theories of intelligence (Senko, 2016). However, achievement goals can also fluctuate greatly within individuals. They are often linked to specific domains and tasks, complexity of material, how interesting the material is to the learner, and learning context (Fryer & Elliot, 2007; Kool et al., 2016; Senko, 2016; Wrosch

et al., 2003). Manipulation of pliable factors provides an opportunity to promote certain goal orientations.

Goal structures describe this environmental orientation towards mastery or performance (Midgley et al., 1988). A perceived goal structure is how the student views their environment as promoting a particular goal orientation. An environment with a mastery goal structure is thought to promote adaptive behavior for learning as much as possible while performance approach or performance avoidance structures result in less adaptive behaviors such as procrastination and identification as high-risk students (Artino et al., 2012). For example, if medical students are placed in an environment in which they're told that successful medical students score high on standardized USMLE exams this would promote a performance approach orientation.

Previous research has emphasized the importance of goal structures on adopted student goal orientations (Gardner et al., 2016). Mastery goal structures are thought to promote metacognitive adaptive learning behaviors while performance structures will promote students to further the 'cut-throat' medical culture of outperforming peers or avoiding incompetence (Artino et al., 2012). This paper will focus on manipulating the learning climate during clinical rounds as a pliable factor to promote mastery goal orientations in medical education.

Achievement Goals and Goal Structures in Preclinical Training

In undergraduate and preclinical years of study, researchers have recognized changes in goal orientation over time and the influence of environmental context on alterations in goal orientations. For example, a study looking at health profession students throughout their undergraduate program found that, while average goal orientations were stable for the group of students, individual goal orientations fluctuated significantly over three years (Kool et al., 2016). They found that fluctuations in self-efficacy was the largest predictor of changing goal

orientations, however they did not study what impacted student self-efficacy over time. They speculated that self-efficacy and goal orientations are influenced by the learning environment and student experience, and educators must identify which constructs are associated with those changing goal orientations (Kool et al., 2016).

Another study found that mastery goals decreased between 1st and 2nd year medical students and increased again with 3rd year students (Artino et al., 2012). The author's propose that this is perhaps secondary to the timing of when a traditional medical student takes the STEP 1 national medical exam at the end of their second year. They consider this drop in mastery approach related to an increased focus on performing on STEP 1. Again, this is an example of changing goal orientations secondary to the learning environment.

One way medical educators have sought to foster a mastery approach orientation in preclinical years is by utilizing a pass/fail curriculum. Each year more medical schools transition from a letter grade curriculum to pass/fail as the latter curriculum promotes learning as much as possible rather than competing with your classmates.

Achievement Goals and Goal Structures in Clinical Training

Goal structures are important in a clinical training setting as well. A study of 3rd year medical students during their surgical clerkship found that students with a mastery goal structure had significant improvement in knot tying task skills compared to students placed in a performance goal structured group. The goal structure of the group differed by the instruction given to students regarding goals in knot tying. The group in the mastery goal structure were encouraged to discover and master the process required to perform well, while the students in the performance goal structure were told to "keep practicing until you reach the target goal of proficiency within 45 seconds." They found that students within the mastery structure were more

likely to regulate their emotions, attention, and effort during the learning process. Furthermore, these students engaged in information processing and thinking processes that are critical to learning while students within a performance structure did not (Gardner et al., 2016).

In a clinical setting the contextual environment a student is learning in often places mastery orientation and performance orientation in conflict. Students may enter the clinical environment wanting to learn as much as they can and participate fully in patient care in order to best serve their patients (mastery orientation). And yet they have to balance this desire with demands of excelling in clinical curriculum objectives which will be important for residency applications (performance orientation). In the clinical years the majority of curriculums are honors/pass/fail in comparison to pass/fail curriculums in preclinical years. This grading shift from preclinical training may move students to a new motivation to impress attendings and outperform their peers as seen in a performance approach in order to reach honors criteria through faculty evaluations. The honors criteria also takes into account score cutoffs on standardized NBME Shelf exams that take place at the end of the clerkship. Students then may feel pressure to prioritize excelling on this exam to deeper learning opportunities seen in practicing patient care.

Students are also continually entering new environments during clinical years. Each week, if not daily, they may find themselves working with a new team at a new location and with different expectations. It is likely that this constant changing environment may result in fluctuating self-efficacy, which plays a significant role in fluctuating goal orientations as seen in undergraduate students (Kool et al., 2016).

Self-Regulated Learning

Beyond being motivated, learners must also be effectively self-regulated. Self-regulated learning was originally proposed by Barry Zimmerman, who described self-regulation as a cyclic process that involves three phases: forethought (or planning), performance, and self-reflection. The forethought phase includes task analysis (goal setting) and self-motivation beliefs (goal orientation). The performance phase includes self-control (attention and cognitive strategies) and self-observation. Finally, the self-reflection phase includes self-judgement (evaluation) and self-reaction (Zimmerman, 2002). Throughout all of these phases, learners need to engage in both cognitive and metacognitive processes that lead to deep, long-lasting learning. Rather than depend on teachers to tell them what to do and how to study, self-regulated learners must persist with learning behaviors that maximize learning outcomes and proactively plan, monitor and reflect on their progress toward self-identified goals (Cho et al., 2017; Pintrich et al., 1993).

Cognitive processes. Cognitive processes of self-regulation include strategies used during learning activities. These are strategies that students should know about so that they can plan their self-regulated learning effectively as part of the forethought phase and hence, use during the performance phase. Some strategies and techniques are more likely to enhance organization, storage, and retrieval of information (Bjork et al., 2013). These learning strategies are often referred to as "deep" strategies and contrasted with "surface" or "shallow" strategies. Examples of deep learning strategies include focusing on meaning while learning, testing oneself, applied problem solving, and delaying feedback until after the learning encounter. Shallow learning strategies might involve rereading information and memorizing facts (Bjork et al., 2013).

Metacognitive processes. Metacognition is the awareness and knowledge about one's own thinking (Zimmerman, 2002). This self-observation allows learners to transfer their mental

abilities into applicable academic skills. There are many aspects of metacognition that play a role in self-regulated learning. This paper will focus on specifically on the components relevant to the performance and self-reflection phases from Zimmerman's model: monitoring one's performance, reflecting on and self-evaluating one's work, and adapting future learning methods. A learner monitoring their work involves recognizing a self-identified goal and where they are at in terms of accomplishing their goal. This monitoring guides active adjusting of cognitive strategies to meet their goal. Reflecting and self-evaluating takes place after the task is complete and involves learners examining their work, evaluating, and drawing conclusions. Finally, adapting future learning methods involves identifying learning gaps and creating plans for how to address these in future tasks (White, Gruppen, & Fantone, 2013). Effective use of metacognitive strategies results in behaviors that optimize learning such as help-seeking behavior, consulting experts and leveraging external resources in the pursuit of their goals, using effective strategies to manage their learning and their time, and accurately appraising their work (White, Gruppen, & Fantone, 2013).

Mastery Goal Orientation as a Precursor to Self-Regulated Learning

Achievement goal orientation is considered a precursor to self-regulated learning strategies. Students' motivation drives how they set their goals, how they plan their study, and the type of learning strategies they use. Students who are motivated to learn as much as possible and find themselves in a perceived goal structure that matches this mastery approach will use a greater number of learning strategies and appropriately self-regulate. A study evaluating medical students found that academic achievement can be predicted based on motivational strategies and self-regulated learning strategies (Soemantri, D. Mccoll, G., & Dodds, A, 2018). A study by Artino et al. (2012) looked at medical student self-regulation habits used during medical school.

They assessed the perception of the learning environment, metacognition, procrastination, and avoidance of help-seeking-behaviors. Their study found that student perception of the learning environment, or perceived goal structures of the learning environment, was associated with their learning strategies. This outlines the important connection between achievement goal orientation theory and self-regulated learning. Students who identified their learning environment to have a mastery goal structure used cognitive and metacognitive learning strategies that negatively correlated with procrastination and failing of standardized NBME exams. In comparison, an environment that was perceived as performance approach or performance avoidant was negatively correlated with NBME scores (Artino et al., 2012). Setting an environment with a mastery goal structure will enable students to initiate beneficial SRL strategies, which will be discussed below.

A clinical environment that promotes mastery orientation could look like utilizing each member of the team as a valuable member of patient care, where students are able to speak up with questions, and where there is trust between student and attending. In this setting students may be more likely to use cognitive and metacognitive strategies like problem solving through more complex information or leveraging external resources to learn as much as possible.

In comparison, a clinical environment where the value is placed on having the right answers, hierarchical relationships, or excelling to reach honors criteria promote a performance goal structure. Medical students will take note of how residents interact with each other and their attending physician in regards to how ideas are shared, questions are asked, responsibility is demonstrated to perceive the general environment and how they may fit in it. They may be less likely to integrate ideal cognitive and metacognitive strategies in this setting.

Why it is Important in Clinical Medical Education

Self-regulated learning is important to study during clinical medical education to understand how cognitive and metacognitive factors impact student approaches to learning. The medical community recognizes the importance of self-regulated learning in clinical medical education. The Accreditation Council for Graduate Medical Education describes a core competency of practice-based learning and improvement in which resident physicians "must be able to investigate and evaluate their patient care practices, appraise and assimilate scientific evidence, and improve their patient care practices (*ACGME Core Competencies*, 2012)." Despite these formal goals of lifelong learning in medical education, there is minimal information published regarding instructional activities used to develop self-regulation during clinical years of training (White, Gruppen, & Fantone, 2013).

Self-regulated learning cannot be assumed to develop automatically (Cho et al., 2017). Fortunately, it may be learned and therefore can be taught through implementation of instructional activities (White, Gruppen, & Fantone, 2013).

Cognitive and Metacognitive Self-Regulation in Pre-clinical Training

In preclinical training self-regulated learning skills can be promoted through problem-based learning and flipped classrooms (Cho et al., 2017). For example, with problem-based learning students are presented with a clinical scenario amongst a group of students. Through assessing the case presented to them they determine a set of learning objectives for self-study in order to meet learning gaps. Then they leave the group, use learning strategies to find answers to the learning objectives they've created, and ultimately come back to the group and teach each other and discuss what knowledge they've gained regarding the learning objectives.

Problem based learning, then, promotes deep cognitive factors of using meaning while learning, testing oneself, and problem solving. Using a clinical scenario helps learners focus on what the illness and treatment mean for the patient, rather than just learning facts. Furthermore, through learning information on their own they go through unguided problem solving. This is followed by testing their knowledge as they teach their classmates what they've learned.

Metacognitively, they must reflect on how well they understand the material and if their research was sufficient as they teach their classmates. This process of learning helps students develop skills in planning, learning, assessing, and adjusting which are the key phases outlined in self-regulation (White et al., 2013). All of this is done in a setting where it is appropriate to bring up questions and where the students are given responsibility to be autonomous in their education. Both of these examples have been well-studied, provide evidence of improved motivation and self-regulated learning skills, and are commonly implemented in preclinical medical education. Medical education has come to recognize the importance of fostering environments that motivate students to learn as much as possible and curriculum that draws students to develop skills in self-regulation.

Cognitive and Metacognitive Self-Regulation in Clinical Training

In comparison, in clinical years of study, in which medical students learn through participation in patient care with clinical faculty serving as their primary instructors, scaffolded curriculum targeting the motivation for students to learn as much as possible and help develop skills of self-regulation are lacking.

There are ample opportunities to implement self-regulation skills in the clinical learning environment because learning becomes more independent as patients become the focus of care. Strategies that foster deep cognitive processing, such as focusing on meaning while learning,

testing oneself, problem solving, and delaying feedback are all accessible in clinical rotations. However, using shallow learning strategies like rereading information and memorizing facts are also available. Similarly, engaging in metacognitive processes such as monitoring, reflecting, and adapting learning methods, are also easily applied in the context of clinical rotations.

For example, evaluating a patient and presenting their case to the medical team during rounds is a process rich with opportunities for deep cognitive processing and metacognitive self-regulation. Students consider which questions to ask patients in order to gain information they need, perform a physical exam that informs their understanding of the patients progression during their hospital course, navigate vital signs and diagnostic tests, and ultimately make a plan for the patient's care. One way a student may do this is to take advantage of cognitive and metacognitive learning strategies to test their ability to take care of the patient, to make practice recalling the relevant steps, self-explaining the reasons behind different treatment plans, making connections to knowledge about physiology and pathophysiology, and reflecting on how the current set of patients are similar or different to past patients. Another way is to utilize shallow learning strategies by repeating objective information about the patient and asking their resident physician what the best plan for the patient should be, or parroting a standard plan of care without thinking about the reasons behind the plan. Students can choose to engage in self-reflection and further learning after the rounds by reflecting on what they knew and what they didn't know, direct their study to fill in gaps, and so on; but students can also easily choose not to.

The challenge during clinical rotations is that there is less scaffolding of implementing self-regulation skills than preclinical years (i.e. problem based learning) to help students successfully integrate these skills. Students note that they look forward to entering the clinical

environment where they can put into practice the knowledge and procedural abilities they've gained during preclinical years, however the discrepancy between linear and guided instruction during pre-clinical years and the informal work environment of clinical rotations where self-regulated learning is necessitated provides challenges to do this successfully (Blitz, de Villiers, & van Schalkwyk, 2019). They also lack self-reflection and the willingness to focus on uncertainties. They need guidance in using learning strategies to tackle the overwhelming amount of information present in the clinical environment (Blitz, de Villiers, & van Schalkwyk, 2019).

Learners leave preclinical training where all attention is on them and their learning, and enter the hospital where the major focus is directed on patients. Despite the benefits of being trained in a problem-based learning curriculum that fosters self-regulatory skills in preclinical years, students require more scaffolding in order to transfer these skills to the clinical environment. This scaffolding may take place through clinical faculty. Clinical faculty are given the great responsibility of continuing to teach medical students as they enter the clinical environment. They have gained expertise regarding a field of medicine and are there to guide students to transfer knowledge and skills gained in preclinical years to the clinical setting. However, as described in the next section, there are also many barriers to clinical teaching that may prevent them from being able to adequately foster motivational and regulatory training.

Barriers to Clinical Teaching

In addition to this responsibility of teaching, clinical faculty also face challenges with their many responsibilities while precepting a hospital team that prevent them from focusing on teaching (Cho et al., 2017). First, while they have extensive training in taking care of patients, they usually have very minimal training in educational principles and teaching strategies (Blitz, de Villiers, & van Schalkwyk, 2019; Iqbal & AlSheikh, 2018). Furthermore, their attention is split between patient care, teaching both residents and medical students with different levels of knowledge, charting and writing notes in the electronic medical record, and often personal research and administration tasks (Pasco, Nixon, & Lang, 2015; Zeidman, Baggett & Hunt, 2015). It is important that they teach students how to be self-regulated with clinical care. And they need this training to be simple and time efficient.

Physicians also believe that formal teaching through presentations and over extended periods of time are most beneficial for learners (Irby & Wilkerson, 2008). This burden of time investment prevents physicians from using opportunities to teach. Irby & Wilkerson (2008) note that, contrary to physician perspective, only small increments of time for teaching during patient care provide powerful learning experiences for trainees.

Expert physicians are also hindered in their ability to accurately assess novices and predict errors that novices make (Chi, 2006; Wolpaw, Papp, & Bordage, 2009). This may result in focusing on teaching that is not aligned with students learning gaps or teaching information they already know. For this reason, it is worthwhile for medical students to be able to assess their uncertainties in medical knowledge and skills and present those to physician experts for guided teaching. A student's willingness to express uncertainties is fostered in an environment promoting mastery goal structures as discussed previously. If the environment promotes a

performance goal structure, students will be intimidated to reveal uncertainties and lose an opportunity for teaching that meets learning gaps. Faculty development, therefore, should include a focus on increasing active and independent learning among medical students and teaching when time is limited (Blitz, de Villiers, & van Schalkwyk, 2019; Irby & Wilkerson, 2008; Soemantri, Mccoll, & Dodds, 2018).

Patient Rounds as a Training Grounds for Motivation and Self-regulated Learning

Patient rounds are the most consistent environment where learning takes place for medical students in their clinical education. During rounds a medical student presents to an attending physician the history, physical exam, diagnostic findings of a patient, and provides an assessment and plan for the course of treatment. Rounds take place daily and students have the opportunity to present multiple patients. Clinical faculty and students can use this opportunity to focus on both patient care and clinical teaching.

Clinical teaching tools have been created for utilization during patient rounds and bridge the gap between medical student needs in motivation and self-regulated learning and the barriers clinical faculty face in teaching these important skills. Medical student learning and teaching by clinical faculty can be improved with utilization of teaching tools that already exist and are well studied. For example, the One-Minute Preceptor (OMP) and SNAPPS are examples of these teaching tools that may be used during patient rounds. Both of these tools have ingredients rooted in achievement goal orientation theory and self-regulation to foster mastery approaches and self-regulated learning strategies in students. While there are many teaching tools available within medical education literature, One-minute preceptor (OMP) and SNAPPS were chosen to explore further, because they have been studied more than other tools. If used, these strategies

could decrease barriers to teaching and promote a better learning environment for learners while fostering skills in self-regulated learning.

The next portion of this report will describe how the OMP and SNAPPS are rooted in achievement goal orientation theory and self-regulated learning and review evidence of improved clinical outcomes when utilizing the tools. The goal of these implementations will be to provide better evidence-based medical education for students in clinical years and develop more effective clinical teachers.

Tools to Support Development of Self-Regulated Learning During Rounds

One-Minute Preceptor as a Learning Tool

The One-Minute Preceptor (OMP) learning tool was developed in 1992 by Neher and colleagues within the field of Family Medicine (Neher, J., 1992) and consists of a sequence of five "microskills". It was designed for clinical faculty who had not received significant training in teaching with a goal of combatting clinical teachers' habits of giving mini-lectures to trainees rather than prompting worthwhile discussions. A second goal of the model is to utilize the presentation encounter to not only diagnose the patient, but also diagnose the student's learning gaps at the same time. This differs from traditional learning models in clinical training that solely focus on diagnosing the patient (Aagaard et al., 2004; Pascoe et al., 2015).

Following a traditional presentation the clinical faculty usually tries to clarify objective information about the case through a series of questions. For example, the clinical faculty might ask, "how old are they?" and "what risk factors do they have?" The faculty member ultimately makes their own diagnosis of the patient. There is little probing and discussion of clinical reasoning with the student presenting or allowance of the student to play an active role in collaborating with diagnosing the patient (Teherani et al., 2007). This traditional encounter does not promote a mastery oriented environment or promote guidance toward deeper learning strategies. In contrast, the OMP prescribes a five-step "microskills" model of clinical teaching that fosters discreet, easy to learn, teaching behaviors (Neher, 1992). The five microskills shift learners from identifying objective information to focusing on the deeper decision-making process within a clinical encounter. The five steps, or microskills, of the OMP are: get a commitment, probe for supporting evidence, teach general rules, reinforce what was done right, and correct mistakes. An example of the application of these five steps during patient rounds is

presented in Table 1. The table illustrates how each of the questions posed by the clinical faculty (Preceptor) map onto each of the OMP steps.

Table 1 illustrates that the encounter begins with a brief opening presentation of the clinical case by the medical student. Then in step 1 the preceptor gets a commitment from the learner. This is one of the most important steps in fostering a mastery goal orientation and a catalyst for self-regulated learning skills. The preceptor asks the learner what they think the diagnosis is or the next step in diagnostic evaluation or patient management. The learner must take in all objective information from the clinical encounter and use clinical reasoning to present what is going on with the patient. If the student has difficulty providing a commitment, this highlights to the preceptor that the learner is either worried about exposing weakness or has not chosen to process the information. A concern of exposing weakness may be secondary to a performance goal orientation, and the preceptor should normalize the process of promoting uncertainties. A lack of commitment due to poor information processing indicates that the learner is not utilizing cognitive self-regulated learning strategies and clinical reasoning. A simple commitment helps the preceptor diagnose the learner. This must take place in a supportive environment for students not to be concerned about evaluation.

The second step involves probing for evidence in which learners should reflect on the mental processes that led them to their commitment. This thinking out loud and reflective process promotes metacognitive self-regulation in the learners and allows clinical faculty to better diagnose the thinking process in learners.

Following step two, in step three the clinical faculty teaches general rules. Based on the learners' thought processes above and any learning gaps highlighted the faculty member may fill

in any gaps regarding diagnosis, diagnostic evaluation, or management. This prompts targeted teaching most relevant to the learner.

The final two steps focus on learning feedback. Step four reinforces what was done right and step five then corrects mistakes. When reinforcing what was done right the preceptor should highlight behaviors that the learner will consciously be able to repeat in future clinical encounters. When correcting mistakes it is ideal to first ask the learner to critique themselves. This allows for metacognitive self-reflective processes important for self-regulation and again promotes an environment where it's okay to bring up failures. When the preceptor comments on mistakes they should again highlight specific things that the learner may alter in future presentations.

Table 1: Example Application of One-Minute Preceptor

Patient presenting with abdominal pain:		
Step	Preceptor	Learner
Opening presentation		"The patient is a 45 year old woman presenting with abdominal pain with associated nausea and vomiting for the past week that is exacerbated following meals. She is afebrile, normotensive, and non-tachycardic. On physical exam the patient is primarily tender at the right upper quadrant region with some mild epigastric tenderness as well."
1. Get a commitment	"What do you think might be going on?"	"The presentation of symptoms sounds like biliary colic, but it could also be cholecystitis, peptic ulcer disease, or pancreatitis."
2. Probe for supporting evidence	"What in the history and physical exam makes you	"The fact that the patient's pain comes and goes and is worse after eating is typical of biliary colic.

Table 1 (continued)

	think most likely biliary colic?"	Also, the localization of pain to the right upper quadrant is expected when the gallbladder is the etiology. She could have cholecystitis but I'd expect her to be febrile, diaphoretic, or have more significant pain. Her epigastric tenderness and pain following meals could also be related to peptic ulcer disease or pancreatitis, but I believe her pain is more localized to the right upper quadrant."
3. Provide general rules	"Another key question to ask patients with biliary colic or other gallbladder disease is if the pain travels anywhere. Pain with biliary colic often may radiate to the back or patients may experience referred pain to the right shoulder blade. This referred pain is due to diaphragm irritation and can also be seen with other intraabdominal problems like liver abnormalities and splenic lacerations."	"That's helpful to know about referred pain. I will consider that in the future."
4. Reinforce what was done correctly	"I think you're right that this sounds like biliary colic. You did a good job narrowing down your differential to biliary colic but keeping other etiologies in the back of your mind."	"Thank you"
5. Correct mistakes	"In the future, be sure to address the patient's risk factor for gallstones. Her age and gender place her at risk. I'd also like to know her weight and history of pregnancy, as obesity and having children also increase risk."	"I'll be sure to take that into account with the next patient presenting with abdominal pain."

Table 1 (continued)

6. Guide learner to area of self-study (optional)		

The benefits to using OMP are robust. At its core the OMP is easy to use and allows clinicians to better assess learners and provide targeted teaching and feedback. Presentations utilizing OMP do not increase time spent on the patient presentation. These strengths are important in overcoming barriers to teaching as described above (Pascoe et al., 2015). Neher (1992) notes that one benefit of OMP is that it can be taught in 1-2 hours, utilized immediately, and remembered for years. For example, Neher and colleagues followed up with 36 faculty members 4 years after they had been taught the OMP and found 90% said they use material from the workshop in over 90% of their encounters (Furney et al., 2001). In fact, those trained in OMP were more likely to change teaching behaviors and motivate students to do outside reading (Farrell et al., 2016).

Furthermore, clinical faculty and learners taught with OMP prefer it to traditional forms of teaching. Clinical faculty are more confident in their ability to accurately evaluate students. Students also evaluate faculty more favorably regarding feedback, involving students in decisions, and overall effectiveness when they utilize OMP compared to standard teaching models (Aagaard et al., 2004; Neher, 1992). Fostering feedback is important to learners, too. With OMP feedback is timely, expected, case-specific, and targeted (Swartz, 2016).

Since its original description, many have introduced a sixth step to OMP in which learners identify the next learning step as noted at the bottom of Table 1. As we will see in SNAPPS, this explicit step helps learners identify uncertainties and choose case-related topics for self-study following the clinical encounter. The sixth microskill is important for both cognitive and metacognitive self-regulated learning and should be included to help students build

habits of personally identifying learning gaps and creating plans for outside learning (Seki et al., 2016).

SNAPPS as a Learning Tool

SNAPPS is a learner-centered approach outlined by a six-step technique for student case presentations (Soemantri, Mccoll, & Dodds, 2018). It was first described in 2003 within the field of family medicine (Seki et al., 2016). It is designed to redirect but not lengthen the learning encounter and was developed for the same reasons as the OMP. That is, it directs students away from providing factual information when presenting patients and toward deeper learning strategies of diagnostic reasoning and exposing uncertainties (Soemantri, Mccoll, & Dodds, 2018). The techniques cultivated using SNAPPS provide systematic approaches for learners to transition from directed learning in the pre-clinical setting to self-regulated learning in the clinical environment.

The model requires medical students to traverse through six steps in a patient presentation: summarize the patient findings concisely, narrow the differential diagnosis, analyze and justify the differential diagnosis adequately, probe the preceptor regarding uncertainties, plan the patient's management, and select case-related issues for self-study. An example of the application of these six steps during patient rounds is presented in Table 2. The table illustrates a medical student's presentation that maps onto each of the SNAPPS steps.

Table 2 illustrates that the encounter begins with a brief opening presentation of the clinical case by the medical student. In step one students summarize the history, exam, and findings while the preceptor actively listens. With SNAPPS students are taught that their summaries need to be limited to the most important objective information. This initial clinical

reasoning in deciding what is most pertinent regarding the patient presentation immediately begins deeper cognitive learning strategies in students.

Moving through the table, in step two the learner presents the differential diagnosis and narrows in on what they believe is most likely occurring. Considering possible etiologies of the patient presentation in the differential assures that students are using cognitive clinical reasoning. Then, committing to what they believe is most likely highlights their thought process to the preceptor. As with the OMP, a lack of commitment or broad differential diagnosis might indicate that the learner is not utilizing cognitive self-regulated learning strategies. Whereas a commitment to a less likely etiology helps the preceptor diagnose the learner and prompt worthwhile discussion. Again, a supportive mastery orientated environment is necessary for students to expose their thought processes without concern regarding their evaluation or being correct. Step two is student directed, however, if the preceptor notes that the differential is too narrow, they should probe the learner to consider what else might be occurring in the patient.

In step three the learner analyzes the differential and explains why they committed to a particular etiology in step two. This step ensures learners reflect on the mental processes that led them to their commitment and promotes metacognitive self-regulation as they think-out-loud with their reasoning. In this step the preceptor may reflect on the student's clinical reasoning and consider what was done well and what other questions the student could think through.

Step four involves student self-reflection to identify questions they have regarding the case that the faculty member can help teach them. This process of normalizing uncertainties aligns with a mastery oriented environment. This step is also worthwhile for the preceptor who can teach in target with student learning gaps.

After finishing this discussion the student moves on to step five in which they plan management for the patient. Again, the learner must use cognitive and metacognitive strategies reason through the best approach for patient care. Finally in step six the student is charged to identify a case-related topic for further study. This promotes important metacognitive strategies that utilizing reflecting and self-evaluating one's understanding and making plans to address learning gaps.

Table 2: Example Application of SNAPPS

Patient presenting with abdominal pain:		
Step	Learner:	Preceptor:
1. Summarize the history, exam, and findings	"The patient is a 45 year old woman presenting with abdominal pain with associated nausea and vomiting for the past week that is exacerbated following meals. She is afebrile, normotensive, and non-tachycardic. On physical exam the patient is primarily tender at the right upper quadrant with some mild epigastric tenderness as well."	Use active listening
2. Narrow the differential	"The presentation is most consistent with biliary colic, however cholecystitis, pancreatitis, and peptic ulcer disease need to be considered."	"Okay, good. Keep going." If the learner does not provide a differential or the differential is too narrow ask what else this might be.
3. Analyze the differential	"The reason I think it's most likely biliary colic is because the patient's pain comes and goes and is worse after eating which is typical of biliary colic. Also, the localization of pain to the right upper quadrant is expected when the gallbladder is the etiology. She could have cholecystitis but I'd expect her to be febrile, diaphoretic, or have more significant pain. Her epigastric tenderness and pain following meals could also be related to peptic ulcer	"You did a good job reasoning through the differential. In addition, what risk factors does she have for gallbladder disease?"

Table 2 (continued)

	disease or pancreatitis, but I believe her pain is more localized to the right upper quadrant."	
4. Probe the preceptor	"I know that in women myocardial infarctions may present with abdominal pain. When should this be considered in patients?"	**"**That's a great question. What risk factors or presentation in the history would make you concerned for a cardiac etiology?" Finish this discussion with the learner. When ready, ask the learner, "what should we do next?"
5. Plan management	"The next step for evaluating biliary colic would be an abdominal ultrasound to assess for cholelithiasis. This would also help us rule out cholecystitis."	"Yes, we will definitely need an abdominal ultrasound. In addition, is there any medication you'd like to start for the patient's pain and nausea?" Finish the discussion on medication. If the student doesn't move to step 6, prompt them.
6. Select case-related issue	"I'd like to look up complications of gallstone disease that may occur if the patient remains untreated."	"That's a great topic. Tomorrow before rounds we will gather as a team and you can let us know what you find."

SNAPPS has been found to promote self-regulated learning in trainees (Kapoor et al., 2017). In a randomized comparison group trial, students using SNAPPS were more concise in their patient summaries and spent more time discussing clinical reasoning. Students in the SNAPPS group also provided twice as many differential diagnoses, justified their decisions five times as often, brought up questions and uncertainties eight times more often, and were the only

group to identify case-related topics for further study in comparison to those utilizing traditional presentations (Wolpaw, Papp, & Bordage, 2009).

Using SNAPPS both the trainee and teacher learn the framework, but importantly the responsibility for directing the teaching encounter is shifted to the learner (Pascoe, Nixon, & Lang 2015). At the outset students will need directed coaching from their clinical faculty to become skilled in using SNAPPS, but over time they will implement the technique successfully and automatically (Wolpaw, Papp, & Bordage, 2009). This is worthwhile for faculty members, secondary to the barriers of teaching addressed previously and for students gaining skills in self-regulation. SNAPPS functions as a time efficient strategy that identifies the needs of the individual learner, allows the preceptor to teach according to these needs, and promotes opportunities for feedback on performance (Irby & Wilkerson, 2008). It is possible that physicians using SNAPPS will be more satisfied with their clinical teaching demands and be perceived as more effective instructors.

SNAPPS also makes presenting uncertainties and identifying case-related topics for self-study a normal occurrence. This expectation counters students desire to always be right and has opportunities to promote a mastery perceived goal structure of the clinical environment (Blitz, de Villiers, & van Schalkwyk, 2019; Wolpaw, Papp, & Bordage, 2009). As mentioned previously, performance orientations are particularly detrimental to novice learners, because they have not acquired basic skills (Seijts & Latham, 2001). Providing a mastery goal structure environment through utilizing SNAPPS might limit students taking on a performance orientation.

Comparing OMP and SNAPPS

OMP and SNAPPS share most key ingredients, however they do have some differences. SNAPPS more directly promotes post-encounter self-regulated learning, because step six asks

students to identify a portion of the case for later self-study. OMP, although less explicit, has also proved successful with promoting self-study. Compared to those under standard teaching models, students taught with OMP were more likely to create post-encounter learning goals (Pascoe et al., 2015). A sixth step of identifying the next learning step may also easily be added to the original model of OMP to overcome this (Seki et al., 2016).

Another difference is that in the OMP the clinician is more responsible in leading the encounter (Pascoe et al., 2015). This may be useful for novice students as they immediately enter the clinical environment. Modeling of teaching strategies by their preceptor provides scaffolding. Following acquisition, a transition to SNAPPS which is more learner directed could be a worthwhile progression.

Seki et al. (2016) found that students using SNAPPS compared to those using OMP felt more comfortable bringing up uncertainties, felt more efficient in presenting, and were more likely to give in-depth case presentations. It is important for clinical faculty to know that if they are using OMP they need to remind students that bringing up uncertainties is accepted and expected, because the guidelines of OMP are less explicit with this. It's also possible that students using SNAPPS are more efficient and give in-depth presentations.

These tools are helpful for the ingredients they contain which promote mastery goal structures and self-regulated learning skills. In time, students and clinical faculty need not use each step of these encounters for teaching. Instead, the ingredients within these alter the environment to promote learning and create automatic habits in learners and faculty members to promote ideal learning strategies (Pascoe et al., 2015).

Implementation: Fostering The Habitual Use of OMP and SNAPPS

Faculty Development

A benefit of the OMP and SNAPPS is that they can be taught to clinical faculty within one to two hours, immediately reinforced in clinical practice, and remembered for years (Neher, 1992). One study followed up with physicians who had been taught the OMP at a national conference four years later. The authors found in a follow up survey of 36 faculty that 90% were using material from the workshop in more than 90% of their teaching encounters (Furney et al., 2001).

Best Evidence Medical Education (BEME) has released multiple systematic reviews on faculty development initiatives intended to improve teaching in medical education (Steinert et al., 2006; Steinert et al., 2016). In both reviews faculty development initiatives are found to be acceptable to clinicians, useful, and promote positive attitude changes toward teaching. They have also found that teaching behavior improvements were reported following initiatives in both faculty participants and students.

Multiple authors have created a guide to developing faculty workshops in which OMP or SNAPPS are taught. Furney et al. (2001) intervened with a one hour session over lunch. They did a 15 minute lecture on the OMP, followed by 20 minutes of role play and debriefing, and finally 15 minute discussion on using the OMP in practice. At the end of the lunch hour they provided participants with pocket cards and asked each member to state their goals for using the model. This is an example of how clinical educators might prepare a workshop. SNAPPS involves one extra step prior to using the tool, because students must also be taught the six-step framework. This can quickly be provided with a similar one-hour intervention during orientation of clerkships or over a lunch hour.

The ease of teaching these clinical tools, minimal time requirement, as well as success with faculty workshops in the past are ideal. After teaching clinical faculty, the next step of faculty educators is to help foster use of these tools.

Habit Formation

It is one thing to learn about learning theories and clinical teaching tools and it is another for clinicians to implement and utilize these tools in their training of students. This is where theory on habits is important. Habits sustain behaviors over time and allow development of automaticity with behaviors. An achievable goal within medical education would be to educate clinical teachers in achievement goal orientation and self-regulated learning, train them in SNAPPS and OMP, and provide environments that promote habit formation to use these tools. This would ensure clinical teachers understand how these tools connect with learning theories and are using evidence-based teaching tools, or at least the ingredients within teaching tools, to foster mastery approach orientations and self-regulated learning skills in students.

Fiorella (2020) describes habits as a critical piece of self-regulation that is often overlooked. Models of SRL describe motivation and metacognition that drive behavior but do not discuss habits. To develop a habit, or habit formation, one must consciously perform a behavior in a certain context. After this is done consciously and consistently, the behavior becomes automatic. One benefit of automaticity is that there is a decreased cognitive load associated with the behavior. This allows directing attention outside of the behavior itself. Eventually, the context will prompt the behavior and conscious effort will not be required.

Clinical teaching involves habits. Traditional forms of clinical education in which following a presentation a physician asks questions in order to diagnose the patient is instigated by habits. It's important to recognize that after training in OMP and SNAPPS there should be a

dedication to fostering habitual use of these clinical tools. Habits of using these tools or ingredients within these tools will foster goals of an environment that promotes mastery orientations and self-regulated learning skills in students.

Habit formation is fostered by three ingredients: a supportive context, habit clues, and rewards (Fiorella, 2020). A supportive context means that the environment allows repetition to occur easily. There are aspects of the clinical environment that may hinder the development of the habit, but also other aspects that support habit formation. Patient presentations themselves can be a highly supportive environment for building a habit in clinical education, because they are a consistent, repeated encounter between clinical faculty and students. The consistent nature of patient rounds makes it a perfect place to introduce new habitual behaviors.

But, we might also consider: what do we need to remove from the clinical environment to limit traditional forms of teaching? Clinical faculty and students often experience high patient loads. This environment may mean that people are under high cognitive load of taking care of many patients and hence, may limit the ability of putting cognitive effort toward consciously using OMP or SNAPPS. The second aspect of habit formation, habit clues, may help alleviate this concern.

Habit clues or "nudging" involves altering the environment to promote wanted behaviors that initiate positive habit formation. For example, when trying to eat healthier, an individual may choose to lay out healthy snacks on their counter the night before. This contextual clue will nudge them the next day to make decisions towards positive habit formation. An important question we must ask is how can we nudge clinical faculty to utilize clinical teaching tools during patient presentations? One example might be a cue card that can be carried during rounds with the steps of OMP and SNAPPS. The cue card provides the steps of OMP and SNAPPS and

serves as a reminder to implement these teaching tools and guidance on how to implement them. This decreases cognitive load for faculty, because they do not need to spend time thinking through each step of the learning tools.

The last step in habit formation is reward. Rewards may be intrinsic, such as feelings of accomplishment, or extrinsic, such as praise. Studies on the OMP and SNAPPS have found that clinical faculty using these tools are more accurate in their ability to evaluate students and teach effectively. This improvement in their clinical teaching ability may serve as intrinsically rewarding. Furthermore, students evaluate faculty more favorably when they use the OMP and SNAPPS in regards to feedback, involving students in decisions, and overall effectiveness. Student evaluations of faculty are externally rewarding as they are a key component of promotion criteria (Aagaard et al., 2004; Neher, 1992).

The implications of clinicians teaching with evidence-based clinical tools such as OMP and SNAPPS has the potential of creating significant effects on student learning. Students would, too, become familiar with the ingredients for learning that prioritizes a mastery goal structure and habits of self-regulated learning skills. Their continual use of these tools could foster automaticity in their clinical learning.

Implications

The purpose of this report is multifaceted. First it seeks to illustrate that medical students need to be motivated lifelong learners in order to adapt to continual changes in healthcare and provide patients with safe and efficacious care (Cho et al., 2017; Cutrer et al., 2017; White, Gruppen, & Fantone, 2013).

Secondly, the report highlights that clinical faculty have a great opportunity in fostering an environment that motivates students to learn and in teaching students to develop skills of self-regulated learning. However, there are numerous barriers that clinicians face to teaching effectively (Irby & Wilkerson, 2008; Pascoe, Nixon & Lang, 2015). For example, physician educators, although experts in medicine, have limited training as teachers (Iqbal & AlSheikh, 2018). They also face competing demands with the electronic health record, complex patients, and personal research interests (Pascoe, Nixon, & Lang, 2015; Zeidman, Baggett, & Hunt, 2015). One belief physicians have is ideal teaching involves a formal presentation, when in fact, teaching quickly and briefly has powerful learning outcomes for students (Irby & Wilkerson, 2008).

Clinical tools such as the One-Minute Preceptor and SNAPPS are useful teaching tools for patient presentations that do not add additional time when presenting but do foster ideal learning outcomes in students. This report addresses how common ingredients within OMP and SNAPPS are rooted in Achievement Goal Orientation Theory and Self-Regulation Theory and are important tools for clinical faculty to use when teaching.

Achievement Goal Orientation Theory identifies the reasons students engage in a learning task. These motivations are organized into two dimensions including mastery and performance goals as well as approach and avoidance (Senko, 2016).

The benefits of mastery approach orientation are ample within general academic settings and specifically academic medicine as well (Kool et al., 2016; Artino et al., 2012, Madjar, Bachner, & Kushnir, 2012). Previous research has emphasized mastery goal orientations with persistence in the face of obstacles, self-regulated learning, help-seeking behavior, and the use of deep processing strategies (Simons, Dewitte, & Lens, 2004; Pintrich & De Groot, 1990; Butler & Neuman, 1995; Dupeyrat & Marine, 2005).

These orientations are associated with stable differences amongst individuals such as fear of failure and theories of intelligence (Harackiewicz et al., 2008; Senko & Hulleman, 2013). Orientations are also associated with pliable differences such as the learning climate (Harackiewicz et al., 2008). These pliable differences are the focus of a students' perceived goal structure as discussed in the report by utilizing OMP and SNAPPS.

It is important for medical educators to prioritize mastery goal structures such as emphasizing progress, risk taking, and creativity over performance (Meece, Anderman, & Anderman, 2006; Kaplan & Maehr, 2007; Karabenick, 2004).

Self-regulated learning involves students' ability to use various strategies to reach a learning goal. While some types of curriculum in the preclinical years, including problem-based learning and a flipped classroom, are known to foster SRL, curricular design promoting SRL in the clinical environment is not commonly assessed (Cho et al., 2017).

Fortunately, self-regulated learning may be learned and therefore has the opportunity to be taught (White, Gruppen, & Fantone, 2013). OMP and SNAPPS are teaching tools providing guidelines for patient presentations that promote self-regulated learning in medical students (Kapoor et al., 2017; Soemantri, Mccoll, & Dodds, 2018; Wolpaw, Papp & Bordage, 2009).

The OMP is a learning tool developed for clinical faculty with little teaching experience to use during patient presentations with medical students. It trains faculty in utilizing five microskills that foster discussion focused on clinical reasoning and decision-making within a clinical encounter (Neher, 1992). This model is guided by the preceptor and would be ideal to implement with novice clinical students who need more scaffolding as they develop skills of self-regulation.

SNAPPS is a similar model to be used during patient presentations and is more learner directed than preceptor directed. Important steps within the model include bringing up uncertainties regarding the clinical case to the preceptor and identifying case-related information for post-encounter self-study (Pascoe, Nixon, & Lang 2015; Soemantri, Mccoll, & Dodds, 2018). SNAPPS is particularly useful for more experienced learners who have gained clinical skills and may direct more cognitive load towards SRL.

Both OMP and SNAPPS foster an environment where the learner is collaborating with the clinical faculty to make medical decisions. They also are in an environment that normalizes bringing up uncertainties. This context promotes a mastery approach orientation in comparison to a performance approach orientation. Both OMP and SNAPPS turn the majority of the teaching on students and allows physicians to implement directed, brief teaching towards specific gaps in learning that students highlight (Pascoe, Nixon, & Lang 2015). Furthermore, studies on OMP and SNAPPS have identified that learners trained with these tools are more likely to identify case-related material for learning post-encounter than students taught with traditional teaching tools.

There is significant evidence that these teaching tools aligned in Achievement Goal Orientation Theory and Self-Regulation are worthwhile forms of instruction for medical students

in a clinical setting. A key next step in medical education is teaching faculty why and how to effectively use these tools in clinical encounters through habit formation techniques.

Implications of these tools are positive for medical students, clinical faculty, and potentially even patients. Medical students who learn in a perceived mastery approach goal structure and build skills of SRL through evidence-based teaching tools have numerous benefits as identified above. Clinical faculty utilizing these tools should experience decreased barriers to teaching, perceived improvement in teaching skills, and may even improve attitudes toward teaching responsibilities. Finally, patients may benefit by clinical faculty and medical students spending more time discussing their case focused on clinical reasoning. They also may benefit in years to come by the medical community producing doctors who are better lifelong learners. Although some of these implications have been previously assessed, such as the benefits of a mastery approach goal orientation, future studies should focus on these implications.

Future Directions

Future studies should take the information presented in this Master's report and implement the OMP and/or SNAPPS in the clinical environment as an intervention to improve student goal orientation and self-regulated learning skills, which could be measured before and after the intervention or against a comparison group who does not receive the interventionClinical faculty's perception regarding ease of implementation, perception of their teaching, barriers to teaching, and student evaluation of faculty would also be worthwhile measures of the impacts of the use of these tools .

Future studies may also assess how and if students transfer SRL strategies gained in one clinical environment to the next. For example, if SNAPPS is mastered in the outpatient clinical

environment are students likely to self-induct the learning tool in the inpatient setting? An automatic implementation of SRL strategies would be impactful on student clinical learning. Furthermore, factors that promote transfer of SRL strategies should be assessed in future studies. Important factors known to promote transfer include personal characteristics such as cognitive abilities, motivation to learn, personal traits, and amount of experience (Iqbal & AlSheikh, 2018). A secondary question to the above is how motivation changes as SRL skills increase. Self-regulated learning is positively correlated with a mastery goal structure, self-efficacy, and personal agency (Blitz, de Villiers, & van Schalkwyk, 2019; Cho et al., 2017). It is possible that these psychological characteristics promote transfer of self-regulation or increase secondary to improved self-regulation.

Another important area to follow is teacher habit formation with OMP and SNAPPS. It would be worthwhile to evaluate alterations in the clinical environment during rounds that particularly promote or hinder habit formation.

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