

# Changing Physician Behavior With Implementation Intentions: Closing the Gap Between Intentions and Actions

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## Abstract

In medical education, even well-intentioned learners struggle to change their practice. This intention–action gap is a well-described phenomenon. Strong commitment to changing behaviors is important, but by itself it is only a modest predictor of goal attainment.

Implementation intentions are an extensively studied strategy from cognitive psychology that have been shown to close the intention–action gap and increase goal attainment across myriad domains. Implementation

intentions are “if–then” plans that specify an anticipated future situation and a planned response—“If I encounter situation X, then I will respond with action Y.” They differ from simple goals, which specify only a desired behavior or outcome—“I intend to perform action Z.” Despite this subtle difference, they have shown substantial effectiveness over goals alone in increasing goal attainment.

In this article, the authors first describe implementation intentions, review the substantial body of evidence

demonstrating their effectiveness, and explain the underlying psychological mechanisms. They then illustrate the connections between implementation intentions and established learning theory. The final section focuses on forming effective implementation intentions in medical education. The authors provide concrete examples across the continuum of learners (from medical students to attending physicians) and competencies, and make recommendations for when and how to employ implementation intentions.

**C**ontinuing medical education (CME) improves medical knowledge,<sup>1,2</sup> yet even well-intentioned physicians struggle to meaningfully change their practices.<sup>2–4</sup> It is well known that despite established guidelines, patients only receive just over half of recommended care.<sup>5–7</sup> Undergraduate medical education (UME) and graduate medical education (GME) similarly face the challenge of developing behaviors that benefit patients and society.<sup>8</sup> More “teaching” is an intuitively appealing approach, but current educational practices are not reliably producing behavior change. Many physicians intend to change their behaviors to apply new knowledge, but they fail to successfully realize this goal.

Most people know from experience that knowledge and good intentions are, by themselves, insufficient to produce behavior change. Empiric studies of

behavior change find that intentions alone account for no more than 28% of the variance in behaviors, and substantially less when confounders, such as past behavior, are taken into account.<sup>9,10</sup> Individuals must execute the behaviors relevant to achieving those goals, a process known as *goal striving*. Goal striving is challenging and often unpleasant. Consequently, it is a common source of failure in attaining goals. A strategy to improve goal striving, known as *implementation intentions*, has been extensively studied in cognitive psychology, and holds substantial promise for medical education.<sup>11,12</sup>

In this article, we discuss implementation intentions. The article is organized in two sections. The first section provides background on implementation intentions: what they are, empirical support of their effects, psychological mechanisms that underlie these effects, and how they relate to existing learning theories. The second section includes suggestions for strengthening implementation intention effectiveness and cautions about their limitations. This section also provides recommendations for how implementation intentions can be used in medical education, including concrete examples across the continuum of learners (UME, GME, CME).

## Implementation Intentions

### What are implementation intentions, and how do they differ from goals?

Implementation intentions are “if–then” plans that specify a future situation and a planned response—“If I encounter situation X, then I will respond with action Y.” To form effective implementation intentions, individuals must anticipate situations that are relevant to their goals and then identify responses that will promote progress toward those goals. For example, let us imagine that Ingrid, an anesthesia resident, wants to learn more about critical care. To help accomplish this goal, Ingrid might form an implementation intention as follows: “If I finish dinner before 9 PM, then I will read for 30 minutes from my critical care textbook.” A fundamental difference between implementation intentions and goal intentions is that goal intentions only express the desire for a particular behavior or outcome—“I intend to do Z” (e.g., “I intend to read more about critical care”). This subtle distinction makes all the difference. Implementation intentions, as compared with goal intentions alone, consistently and meaningfully increase the likelihood of accomplishing one’s goals.

### Research evidence

The remarkably simple structure of implementation intentions may cause

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some to dismiss them as not capable of substantially changing behaviors. However, their simplicity belies their powerful empiric effect. As an example, Milne and colleagues<sup>13</sup> randomized 248 undergraduates to one of three groups (one control group and two experimental groups) and recorded how many participants exercised in the subsequent week. Participants in the control group were told that they would be asked to report exercise behaviors over the next week. The first experimental group received a strategy to increase their motivations to exercise (akin to simply strengthening their goal intentions). The second experimental group received the same motivational strategy and also participant-generated implementation intentions (e.g., “If it is Tuesday morning, then I will go for a run”). Following the interventions, both experimental groups had equally increased motivation to exercise over the control group. After one week, 38% of the control group had exercised. Similarly, despite their strong intentions, only 35% of the motivational group had exercised, with the majority stating that they were too busy, had forgotten, or did not get around to it. In contrast, 91% of the implementation intentions group had exercised ( $P < 0.001$ ).

This powerful effect has been replicated in a variety of settings. Implementation intentions are effective with many goal types (e.g., academic, health, personal, prosocial, and environmental) and with varying populations (e.g., children, young adults, university students, and general public).<sup>11</sup> In a meta-analysis of nearly 100 studies, implementation intentions demonstrated a medium to large effect ( $d = 0.65$ ) on increasing goal attainment above and beyond the effects of goal intentions alone.<sup>11</sup> (Cohen’s  $d$  is a measure of the differences between two means divided by their pooled standard deviation. Values for small, medium, and large effects are  $d = 0.2$ ,  $d = 0.5$ , and  $d = 0.8$ , respectively.<sup>14</sup>)

### Implementation intentions help overcome the challenges of goal striving

Achieving goals is hard work, and the process of goal striving is fraught with challenges. Two key challenges to goal striving are, first, simply taking action when good opportunities arise and, second, staying on track with positive behaviors in the face of distraction (see



**Figure 1** Visual representation of goal intentions, goal striving, and goal achievement. Goal striving (executing the behaviors necessary to accomplish goals) is a process that connects goal intentions to goal achievement. Because the behaviors are often challenging and unpleasant, goal striving is a common failure point in achieving goals. Two of the main challenges of goal striving are initiating goal-directed behaviors and staying on track with those behaviors.

Figure 1). Implementation intentions help overcome both of these challenges.<sup>11</sup> Implementation intentions have been most studied with the first of these challenges—initiating goal-directed activities—with a medium-to-large effect in meta-analysis ( $d = 0.61$ ).<sup>11</sup> As illustrated in the Milne study previously described, individuals who use implementation intentions are more likely to act when a good opportunity arises, and they are less likely to forget to act or be swayed by distractions.<sup>15,16</sup> This effect is present even for initiating unpleasant tasks necessary to achieve desirable goals (e.g., performing breast self-exams, attending cervical cancer screening, resuming functional activity after joint replacement, eating a low-fat diet).<sup>13,17–19</sup> As an example in medical education, our anesthesia resident Ingrid would be more likely to read from her critical care textbook when she prespecifies the situation (e.g., “If I finish dinner before 9 PM”) with an implementation intention. Second, implementation intentions help individuals stay on track by decreasing responses to critical distractions ( $d = 0.77$ ).<sup>11,20–22</sup> Indeed, individuals who use implementation intentions have shown sustained behavior change up to two years after a single intervention.<sup>23</sup> For Ingrid, who is often distracted by social media while studying, an implementation intention such as “If I receive a Facebook message while studying, then I will ignore it” may help.

These two challenges of goal striving (initiating goal-directed behaviors and staying on track with positive behaviors) are the most well studied. However, other goal striving challenges do arise, and implementation intentions have been helpful in overcoming those challenges as well. For example, individuals who are attempting to change their behaviors often become exhausted because controlling one’s behavior (self-regulation) requires substantial effort.

Because implementation intentions help automate behaviors (discussed in the next section), individuals preserve their capacity to self-regulate to a high degree ( $d = 1.28$ ).<sup>11</sup> In Ingrid’s case, by strategically automating her textbook reading behavior during the day, she may be more willing to read the extra journal article her attending e-mailed her in the evening, even if she is tired. For readers interested in reading more about these and other goal striving challenges (e.g., disengaging from futile goals), we recommend the meta-analysis by Gollwitzer and Sheeran.<sup>11</sup>

### Underlying psychological mechanisms: Strategically automating behaviors

To form an implementation intention, individuals must identify a relevant future situation. By doing so, the mental representation of that situation becomes highly activated, and individuals are more likely to detect the critical situation when it arises.<sup>12,24–27</sup> Put simply, individuals are less likely to miss the critical opportunities to act toward their goals. Implementation intentions also solidify the link between that situation and the intended response. The consequence of this strengthened connection is the strategic transfer of behavioral control from the individual (i.e., by goals) to the environment (i.e., by situational cues).

Together, these two mechanisms—heightened accessibility of specified cues and strengthened cue–response links—are what allow individuals to more effectively make progress toward their goals with implementation intentions. Individuals no longer have to consciously deliberate when and how to act. Behaviors guided by implementation intentions occur with decreased response times,<sup>15</sup> and this is true even in the presence of high cognitive load<sup>28</sup>; furthermore, there is no longer a need for conscious intent.<sup>29,30</sup> This transfer of control to an automatic mechanism is supported by multiple empirical

studies.<sup>30–32</sup> For example, individuals who have formed implementation intentions enact their planned responses more quickly than individuals who form goal intentions alone, even when they are shown the specified critical cues only subliminally.<sup>30</sup>

### The relationship between implementation intentions, learning theories, and current educational paradigms

Competency-based medical education places foundational importance on observable performance in the actual learning environment. It also focuses on the attainment of knowledge, skills, and attitudes that meet the needs of patient populations.<sup>33,34</sup> This higher-order focus aligns well with the highest levels of Kirkpatrick's<sup>35</sup> hierarchy (performance in the workplace and patient outcomes), Miller's<sup>36</sup> pyramid (does), and Bloom's revised taxonomy<sup>37</sup> (applying, analyzing, evaluating, and creating). These more advanced goals are challenging to attain given their loftier nature. Fortunately, implementation intentions' focus on behaviors and outcomes makes them an appealing strategy to achieve these challenging goals.

Cognitive load theory helps explain why implementation intentions are so effective. Cognitive load is the mental activity spent using and managing working memory.<sup>38,39</sup> It has three components: intrinsic load (difficulty inherent to the material), extraneous load (difficulty generated by noneducational aspects of how the material is presented to a learner), and germane load (difficulty of creating and automating schemas).<sup>40</sup> Individuals have remarkably limited capacity for cognitive load. Because implementation intentions help automate behaviors, they can both decrease cognitive load and allow the desired behaviors to occur even in the presence of high cognitive load.

### Applying Implementation Intentions: How to Make Them Work for Medical Education

#### Forming effective implementation intentions: Moderators of success

The effectiveness of implementation intentions is moderated by several factors, including how challenging the goal is, features of the if-then components selected, and features of the individual's overarching goals and motivations.

First, implementation intentions are particularly useful for challenging goals because behaviors that are easy to control do not require meaningful self-regulation. Notably, just because a behavior should be easy to control does not mean that it will be for all individuals, and in such cases implementation intentions remain useful.

Second, implementation intentions work best with thoughtful selection of the anticipated triggers (critical situations) and planned responses. The triggers can be internal (e.g., feelings) or external (e.g., particular situations). They can represent good opportunities for goal striving or critical obstacles that could derail efforts. Selected triggers should be unambiguous. Think about Ingrid. For her, "If it is tomorrow, then I will study" is too vague to be useful, whereas "If I am sitting down for lunch in the cafeteria, then I will do review questions on my smartphone" may help. The triggers should occur commonly and represent situations where behaviors are easy to alter. For example, if Ingrid rarely eats lunch in the cafeteria, or if whenever she does her attendings do as well and expect to engage her in discussion, then this may not be an optimal situation after all. Planned responses should be feasible (e.g., it would be unrealistic for Ingrid to read five articles over lunch) and should be instrumental to making progress toward one's goal (e.g., Ingrid will be better off reading seminal articles instead of unreferenced Internet sites). Additionally, responses geared at negating unwanted behaviors (e.g., "If I get an e-mail while studying, then I will *not* look at it") are less effective than replacement (e.g., "... then I will silence my smartphone") or ignore (e.g., "... then

I will ignore it") responses.<sup>41</sup> Reflecting on selected implementation intentions and adjusting them over time is useful to find the most effective situations and responses.

A third moderator relates to overarching goals and motivations of the individual. Implementation intentions that go against overarching goals are unlikely to be successful. For example, if Ingrid forms an implementation intention to read an article quickly, when her overarching goal is to be meticulous, she is less likely to be successful. More generally, implementation intentions are not effective when goal commitment is low.<sup>17,29,42</sup> For instance, if Ingrid's colleague Noah has no intention of reading about critical care, implementation intentions will not affect his behavior. Implementation intentions rely on motivated individuals but do not affect motivation itself. Consequently, implementation intentions have been combined with motivational strategies to substantially increase their effectiveness. Box 1 briefly discusses *mental contrasting with implementation intentions*. This combination merits specific mention because of the growing body of research being performed on this dual strategy.

Finally, it should be stressed that when implementation intentions improve goal striving, they do not result in the perfect execution of desired behaviors every time those behaviors are cued. The lack of perfect gains with implementation intentions may discourage some individuals. Moreover, even when performance is improved with implementation intentions, individuals may not perceive this improvement

## Box 1

### Mental Contrasting With Implementation Intentions

Mental contrasting involves contrasting the greatest benefits of goal achievement (e.g., Ingrid feels she will be a much better physician who can meaningfully improve the lives of critically ill patients) with the most relevant current obstacles to reaching that goal (e.g., Ingrid often lets herself become distracted with Facebook, spending up to an hour per day looking at posts).<sup>16,48–50</sup> Mental contrasting selectively increases goal commitment for goals that are desirable and feasible.<sup>44,48–52</sup> As individuals plan how to overcome these obstacles, the obstacles themselves become the triggers for subsequent implementation intentions—"If I am distracted with Facebook posts, then I will turn off my phone and read for 15 minutes." This combination of mental contrasting with implementation intentions, termed MCII, has been studied extensively over the last decade. The combined effects of MCII produce higher rates of goal attainment than does either mental contrasting or implementation intentions alone.<sup>53,54</sup> Empirical studies of MCII have shown sustained positive effects on goal striving for months to years after a single brief intervention.<sup>23,47</sup> MCII has also been called "WOOP" (Wish Outcome Obstacle Plan), and interested readers can learn more at [woopmylife.org](http://woopmylife.org).

Abbreviations: MCII indicates mental contrasting with implementation intentions.

because implementation intentions lead to behaviors that occur without conscious intent.<sup>30–32</sup> Because individuals may not perceive these beneficial effects, we strongly recommend that studies of implementation intentions in medical education focus on objective outcomes rather than participant perceptions of effectiveness. These considerations should be familiar to physicians. Consider the patient who takes aspirin for secondary prevention of cardiovascular disease. Aspirin will not prevent all cardiovascular disease, and the patient will not consciously appreciate its effect. Yet we will still recommend aspirin because of the substantial supporting evidence.

**Gaps in the research agenda**

Implementation intentions are not new to medicine. They have been used in various settings to help patients achieve their health goals (e.g., taking daily medications, quitting smoking).<sup>43</sup> Similarly, implementation intentions are not new to education. They have been studied in elementary and high school education to help learners meet their academic goals, and they have been used with undergraduates to help them learn science material.<sup>44–46</sup> To our knowledge, however, no studies have examined implementation intentions in medical education. Specifically, it is not known how implementation intentions relate

to following through on academic and professional goals for medical learners.

In medical education, implementation intentions should be studied upstream in the learning process to improve the self-regulation of self-directed learning. If medical learners are sufficiently similar to previously studied groups, then those who use implementation intentions should be more likely to follow through on their learning intentions. As an example, a comparative effectiveness design could compare residents who are trained to set goals to those who are trained to form implementation intentions. Additionally, coupling

**Table 1**  
**Examples of Implementation Intentions Across the Accreditation Council for Graduate Medical Education Core Competencies and the Learning Continuum<sup>a</sup>**

Core competency	UME	GME	CME
Patient care	<i>If I feel worried that a patient is deteriorating, then I will immediately call for help.</i> <i>Initiate goal striving</i>	<i>If I am taking over care of a vascular case, then I will make sure to carefully examine the ST segments on telemetry.</i> <i>Initiate goal striving</i>	<i>If I am feeling bored during the care of a straightforward patient, then I will check on the surgeons' progress and mentally elaborate potential complications.</i> <i>Shield efforts from unwanted influences</i>
Medical knowledge	<i>If my friends ask me to hang out on Saturday night, then I will tell them that I will come late so that I can study first.</i> <i>Shield efforts from unwanted influences</i>	<i>If I am standing in line for coffee, then I will review flash cards on my smartphone.</i> <i>Initiate goal striving</i>	<i>If my children are asleep before 9 PM, then I will go to my desk to read an article from this month's journal.</i> <i>Initiate goal striving</i>
Systems-based practice	<i>If I believe there is a safety concern, then I will ask my senior resident for help to correctly enter a safety report.</i> <i>Initiate goal striving</i>	<i>If I am alerted about noncritical patient issues while addressing more critical issues, then I will briefly explain this and redirect my attention to the critical issue.</i> <i>Shield efforts from unwanted influences</i>	<i>If I am running a code and there is a distracting task I could do (e.g., CPR), then I will assign that to someone else and remain at the foot of the bed.</i> <i>Shield efforts from unwanted influences</i>
Practice-based learning and improvement	<i>If I am leaving the hospital for the day, then I will reflect on areas for personal improvement during my walk home.</i> <i>Initiate goal striving</i>	<i>If I experience difficulty in mask ventilating or intubating a patient, then I will reflect on my process and ask my attending for advice.</i> <i>Initiate goal striving</i>	<i>If I receive negative feedback from a resident, then I will look for growth opportunities instead of feeling personally attacked.</i> <i>Shield efforts from unwanted influences</i>
Professionalism	<i>If a friend asks me about my patients, then I will say that I cannot share that information.</i> <i>Shield efforts from unwanted influences</i>	<i>If my phone vibrates during conference, then I will ignore it.</i> <i>Shield efforts from unwanted influences</i>	<i>If a colleague is being obnoxious, then I will try to understand his point of view instead of responding aggressively.</i> <i>Initiate goal striving</i>
Interpersonal and communication skills	<i>If I feel that the team should reconsider a medical decision, then I will use the two-challenge rule.</i> <i>Initiate goal striving</i>	<i>If there is critical communication that needs to happen and there is music playing, then I will ask the circulating nurse to turn off the music.</i> <i>Shield efforts from unwanted influences</i>	<i>If I see anyone on the team adopt an expression that looks like disagreement with or confusion about a plan, then I will ask that individual for their thoughts.</i> <i>Initiate goal striving</i>

Abbreviations: UME indicates undergraduate medical education; GME, graduate medical education;

CME, continuing medical education.

<sup>a</sup>The challenge to goal striving to be overcome is referenced in italics.

teaching with implementation intentions for learners could strengthen the link between new knowledge and action (e.g., “If I see signs of sepsis, then I will prioritize antibiotics”). As a result, patients would benefit from receiving *actual* care that better aligns with *intended* care, thereby narrowing the gap between theory and practice.

### How to use implementation intentions in medical education

Although more research is needed, implementation intentions can be applied to a number of goals in medical education. To illustrate potential applications of implementation intentions, we have created a number of examples. These are organized in Table 1 by the six Accreditation Council for Graduate Medical Education competency domains and by level of training (UME, GME, CME). We selected the competency framework for its broad applicability and use across the educational continuum. The competency domains also offer a diverse set of goal situations that illustrate the broad potential for implementation intentions. We have done this from the perspective of anesthesiology training to illustrate a single continuum, but translation to other specialties should be straightforward. Indeed, many of the examples apply readily to other medical specialties.

### When to use implementation intentions in medical education

In early studies of implementation intentions, participants were helped to form specific implementation intentions or were simply given implementation intentions. The natural parallel is for educators to provide trainees or colleagues with implementation intentions as adjuncts to lectures or quality improvement efforts, or as adjuncts to publications that aim to impact practice. See Box 2 for an example of adding implementation intentions to a publication.

More recently, implementation intentions have been successfully employed as a meta-cognitive strategy, where investigators train participants on how to use implementation intentions on their own, without direct oversight.<sup>23,47</sup> This approach lends itself to strengthening independent self-regulation of behaviors, such as skills workshops or individual mentoring. For example, we can

## Box 2

### Make Your Own Implementation Intention

Exercise: Make an implementation intention to help a trainee realize her goals. First, envision a situation (a good opportunity) to help a trainee with her goals. What are the situational cues that will signal that opportunity to you? What will be that unambiguous trigger? Perhaps you will be in your office meeting with a mentee, like Ingrid, who has struggled to follow through on reading goals. Once you have selected a situational trigger, think about how, specifically, will you react when you find yourself in that situation? Maybe you will help your mentee link good opportunities to read with specific plans to do so. Or perhaps you will help them identify critical obstacles, and make plans to overcome those. Now, combine the specific situational cue you have identified with your planned response to make an “if-then” plan. For example, “If I meet with a mentee who is struggling with reading goals, then I will help her make an effective implementation intention for herself.” Finally, rehearse the plan in your mind or repeat it aloud.

train Ingrid on how to make effective implementation intentions, so she can apply them of her own accord to any professional domain where she struggles to attain her goals. Subsequently, reviewing her goals and implementation intentions can become a standard part of scheduled program director or mentor meetings.

### Summarizing Thoughts

Implementation intentions detail the when, where, and how of goal striving through the formation of specific if-then plans. They facilitate goal realization by strategically automating intended behaviors. Implementation intentions have the potential to substantially improve medical education by helping learners achieve their learning goals, and further investigation is warranted. They may be equally powerful in the practice of medicine by closing the gap between education and practice, and thereby improve the care delivered to patients.

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