

Self-regulation as a link between goal attainment and decision-making

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Simona Ďurbisová  |  simona.durbisova@student.upjs.sk

Department of Psychology, Faculty of Arts, Pavol Jozef Šafárik University in Košice, Slovak Republic

Abstract | Objective: Goal attainment is a complex process shaped by numerous decisions individuals make on their way to successfully reaching the desired objective. While there is no doubt about the impact decision-making and goal-attainment have on each other, a unified approach exploring how these processes work together is lacking. Nonetheless, the existing literature has suggested various possible ways of connecting them, such as through self-regulation. Self-regulation plays a pivotal role in an individual's efforts in reaching a goal, especially in the case of distractions and obstacles which threaten the success of this process. The literature is not short of various approaches to different self-regulatory strategies, making it harder to integrate them in a way that would be helpful to the research in other areas. Some authors (Higgins et al., 2020) have pointed out a possible connection between the regulatory focus and a certain type of thinking that can be characteristic for specific decision-making styles. These decisional tendencies have also been recognized as not only patterns reflecting habits and thought processes but also as general tendencies of self-evaluation and carrying out intentions (self-regulation) (Thunholm, 2004). Self-regulation is present during both decision-making and goal-attainment and can serve as one of the possible links between these processes; there is some evidence of a relationship between certain decision-making styles or mal/adaptive strategies and self-regulation in general (Thunholm, 2004; Halama, 2017), and there have been studies which have focused on specific self-regulatory strategies, such as implementation intentions and the regulatory focus in connection with cognitive and decision-making styles, and the evaluation of sequentially presented information (Bieleke & Keller, 2019; Bullard et al., 2017; Ďurbisová, 2020). Some recent studies have focused on specific aspects of the decision-making process during goal attainment. These aspects could be considered manifestations of self-regulation and have been shown to be related to action crisis and selected goal characteristics (Bavoľár et al., 2021; Ďurbisová & Bavoľár, 2021). This novel approach might act as an important impetus for further research. Considering the role of self-regulation in both the decision-making and the goal attainment process and focusing on other specific self-regulatory strategies, such as implementation intentions or the regulatory focus, might provide a better insight into goal-directed behavior. As a result, this could lead to enhancements in research methods and specific strategies and training programs aimed at more effective ways of reaching goals. Conclusion: The existing literature provides the basis for connecting decision-making and goal-attainment in a way that might be beneficial for further research. The goal of this paper was to explore the importance of focusing on self-regulation and specific self-regulatory strategies as a link between these processes, and to outline the possible applications in psychological research and practice.

Keywords | Self-regulation, Goal-attainment, Decision-making

Introduction

The structure of everyday life is largely impacted by the way individuals make decisions and set the goals they are trying to achieve. The amount of existing literature on these topics alone attests to their importance in all areas of life. Goals as the mental representations of desired end states, often involve the presence of a voluntary decision to reach such outcomes by an individual's own actions (Lovaš, 2017). It is clear that the decision-making process and the process of goal setting and achievement are intertwined. This makes it almost impossible to talk about one without mentioning the other. Yet, given the extensivity of these topics, it is not easy to find a unified model or approach which brings all the parts together. Nevertheless, the current literature provides several various links connecting these processes. One of the main connections is self-regulation, which is important in every step of making decisions during the goal attainment process. Up until recently, decision-making had not been given enough attention in research looking at goal achievement (Bavořár et al., 2021). Taking self-regulation into consideration when focusing on these processes can prove beneficial for a deeper understanding through adjusted research methods. Therefore, the goal of this paper is to discuss the importance and usefulness of self-regulation as a not entirely researched link between decision-making and goal attainment processes.

1. Goal attainment

1.1 *The Rubicon Model of Action Phases*

The process of goal achievement has been discussed in a number of models. The Rubicon Model of Action Phases is one example, which describes the process from choosing the goal one wants to achieve to evaluating the success of the steps taken to attain it (Achtziger & Gollwitzer, 2018). The goal intentions help to transform a desire to a specific goal during the first pre-decisional phase (Achtziger & Gollwitzer, 2018). The process of setting a specific goal not only directs the individual's efforts and attention towards goal-relevant activities (and away from goal-irrelevant ones) but also affects other important factors such as motivation (Lebeau et al., 2018). Previous research has shown the effectiveness of setting goals that are challenging and of certain difficulty (while still being objectively reachable) on higher levels of motivation and persistence (Lebeau et al., 2018).

Goal setting is closely related to other processes such as planning. The second pre-actional phase of the model consists of identifying the most suitable ways of reaching the goal as well as overcoming the expected difficulties and obstacles (Achtziger & Gollwitzer, 2018). This phase therefore focuses on a detailed specification of the procedures the individual chooses to achieve the goal - the implementation intentions (Achtziger & Gollwitzer, 2018; Brewster et al., 2015; Freydefont et al., 2016). Implementation intentions help the individual to move from the intent (setting the goal) to the behavior necessary for reaching the desired state. They usually take the form in which they address the potential to apply planned appropriate activities in the case of a suitable situation occurring (Brandstätter & Hennecke, 2018). Their structure consists of a certain condition (situation) which invokes planned activities when it appears. This has the general form of "if-then plans": "If condition X appears, then my response will be reaction Y." (Achtziger & Gollwitzer, 2018; Brandstätter & Hennecke, 2018). An example of an implementation intention might be: "If I get a craving to eat chocolate after lunch, then I will drink a glass of cold water." It is a conscious activity which allows the mental representation of a possible appearance of a certain situation and adequate behavior to be easily accessible. This makes it easier for the individual to notice the stimuli in their surroundings and speeds up their reaction to it (Achtziger & Gollwitzer,

2018; Brandstätter & Hennecke, 2018; Oettingen et al., 2015). Implementation intentions are not only effective in the case of specific situations that have been identified as critical for taking the necessary steps for successful goal achievement, but also in the case of situations that are similar enough to the condition stated when forming the implementation intention. This important generalization solves the problem of not being able to exactly predict the form of the critical situation or having to prepare many plans as many critical situations might appear (Bieleke et al., 2018). The individual can then easily notice the stimulus that is similar enough to the stated condition and perform an adequate behavioral reaction even if they are preoccupied with a different task. This activity spares the individual's cognitive capacity since the conscious intent is not needed at that current moment. In this way the automated and controlled processes merge into behavioral regulation (Brandstätter & Hennecke, 2018; Milyavskaya & Werner, 2018). Implementation intentions can be therefore considered a form of regulating the goal-attainment process. Their ability to help achieve various goals has already been well documented academically (Freydefont et al., 2016) as well as in correcting health-related habits (de Vet et al., 2011), improving time management abilities (Oettingen et al., 2015) and decreasing traffic-rules violation (Brewster et al., 2015).

The third action phase of the Rubicon Model describes the application of the planned activities aimed at successfully achieving the goal, while the last post-actional phase is concerned with evaluating the whole process (Achtziger & Gollwitzer, 2018). This has an impact on the future behavior of the individual in either trying to achieve the first goal again or applying similar strategies in achieving future goals (Achtziger & Gollwitzer, 2018). This model describes general phases that occur in most cases of goal achievement, no matter the type of goal.

1.2 Action crisis

This whole process is rarely without complications and is not always successful. The efforts of the person trying to achieve the desired outcome are affected by numerous internal and external factors. When the environmental conditions constantly change, or there is a lack of opportunities, or the individual has failed to overcome obstacles more than once, they might start to question the desirability and achievability of the goal. This may lead the person to re-evaluate the goal and its alternatives (Brandstätter & Schüler, 2013; Herrmann et al., 2019). When the individual has already invested effort in achieving the goal but is failing, an action crisis might occur. This leads to a cost-benefit analysis of continuing or ending the process (Brandstätter & Schüler, 2013; Herrmann et al., 2019). An action crisis is often associated with negative outcomes such as stress, low levels of performance and self-esteem as well as memory problems (Brandstätter et al., 2013; Herrmann et al., 2019; Lebeau et al., 2018). On the other hand, there are also some positive outcomes related to "opening one's eyes" to new possibilities of solving a problem and reaching the desired end (Brandstätter et al., 2013; Herrmann et al., 2019).

1.3 Self-regulatory strategies

The process of goal attainment can be regulated by various means such as implementation intentions. This form of regulation can be perceived as an important aspect of self-regulation (Lovaš, 2017). Self-regulation and its related concepts have been studied for decades which has resulted in a considerable amount of literature focusing on self-regulation and its various strategies. Self-regulatory strategies relate to certain patterns of choosing the way an individual directs their goal-oriented behavior. However, there are various approaches to self-regulation, its specific strategies and application. Sassenberg and Scholl (2019) have highlighted the integration of research concerned with the "common ground" of different approaches to self-regulatory strategies is lacking, although some have attempted to bridge the gap (e. g. Đurbisová & Lovaš,

2020). Various authors have examined the connections between some approaches, which has resulted in possible new models, such as the Need-support Model (Vaughn, 2017) and the Integrative Model of Eagerness and Vigilance Regulation (Sassenberg & Scholl, 2019).

Vaughn's (2017) Need-support Model connects the Regulatory focus theory (RFT) and Self-determination theory (SDT). The main concern of SDT is the variation of goals from autonomous to controlled depending on the magnitude of the will of an individual trying to reach the goal (Lovaš, 2017; Werner et al., 2016). While the main concern here is with the cause of goal-attainment, Vaughn (2017) sees a certain link to the RFT, which is presented in her Need-support Model. Although this model exceeds the aim of this paper (see Ďurbisová & Lovaš, 2020 for more), it is important to note that it highlights the potential ability of an individual to regulate the increase or decrease in needs through motivational orientation focused on growth and safety (Vaughn, 2017). The RFT is based on two self-regulatory strategies – approaching positive or avoiding negative stimuli. In RFT, there are fundamental needs based on two motivational systems. These are the promotion focus related to the need for growth, and the prevention focus related to the need for safety (Higgins, 2015; Higgins et al., 2020). The promotion focus can be observed in individuals who are eager to reach an ideal state that reflects their desires and hopes, and are mainly interested in the presence (or lack) of positive states (gains) (Higgins, 2015; Higgins et al., 2020). On the other hand, the prevention focus can be observed in individuals who are first and foremost vigilant when trying to achieve goals concerning their duties and commitments, and are interested in the presence (or lack) of unpleasant states (losses) (Higgins, 2015; Higgins et al., 2020). The regulatory focus is not only related to the end state but also to the strategies the individual favors when trying to reach the goal (Higgins et al., 2020). The promotion focus can be connected to thinking that is fast, accurate, creative and emotion-based (Higgins et al., 2020). This can lead to an assumption of a certain connection between the regulatory focus and the characteristics of certain decision-making styles.

2. Decision-making

The ways in which individuals come to a final decision have been of interest to researchers for many years. In an ideal world, people would have enough time as well as the information needed to make a decision. In reality, this is rarely the case given the amount of time necessary to accumulate and process all the information, as well as the fact that a person makes dozens of decisions every day. This ideal is therefore not only almost impossible, but also potentially dangerous because of information overload. This could have a negative effect not only on decisional outcomes but also on the decision-making process itself (Douneva et al., 2019).

The decision-making process can be influenced by numerous factors. Generally, three groups of factors have been proposed as having the greatest effect. Firstly, the characteristics of the decision (features of the decisional task or problem); secondly, the environmental or situational factors, and thirdly, the interindividual differences (Appelt et al., 2011). Even the approach to explore this process may vary depending on the factors it considers and the degree to which it is sensitive towards the situational context. Therefore, decision-making can be viewed from the point of the current environment and context or from the point of relatively stable general tendencies stretching throughout a longer period of the individual's life. The latter can be reflected in decision-making styles (DMS).

2.1 Interindividual differences in decision-making

There is an abundance of definitions when it comes to decision-making styles and their types. Generally, they are regarded as the long-lasting tendency of a person to approach most decision

situations in a similar way (Wood & Highhouse, 2014). It is important to note there are a number of related constructs, such as cognitive styles which describe an individual's general tendency related to receiving and processing information (Wood & Highhouse, 2014). While some regard cognitive styles as almost synonymous to decision-making styles, others believe them to be a broader category which contain specific decision-making styles (Wood & Highhouse, 2014). Given this, the existing literature is rich in different approaches towards the types of styles. While most of them stem from the dual-system conceptualization of rationality and intuitiveness (Constantiou et al., 2019), other authors have started to recognize more than just the rational and intuitive styles.

Scott and Bruce (1995) have identified five DMS: the rational, intuitive, dependent, avoidant and spontaneous styles. The rational style stresses the importance of obtaining and adequately evaluating all relevant information concerning every possible alternative (Abubakar et al., 2019; Thunholm, 2004). In contrast, the intuitive style is characterized by relying on premonition and current feelings rather than focusing on details or using a system when sorting through the information (Abubakar et al., 2019). The dependent style is characterized by seeking out guidance and advice from others, while the avoidant style describes doing everything possible in order to avoid making a decision (Thunholm, 2004). The spontaneous style can be defined by the feeling of urgency and desire to end the decision-making process as quickly as possible (Thunholm, 2004). These styles are identified by the General Decision-Making Style Inventory created by Scott & Bruce (1995). While there are some differences between these styles, many authors have pointed out the relationship between them and have proposed focusing on the combination of different DMS individuals use (e. g. Bavořár & Bačřiková-Sleřková, 2020).

Another approach which explores the interindividual differences in the decision-making process focuses on adaptive and maladaptive reactions to stress caused by the decisional conflict stemming from the fear of loss when making a wrong decision or depleting personal resources (Bavořár, 2018). The four styles, one adaptive and three maladaptive, are included in the Melbourne Decision-Making Questionnaire (Mann et al., 1997). The adaptive style is characterized by vigilance which is the effort to clarify key components and seek out relevant information which is then objectively included in a thorough evaluation of the alternatives (Halama, 2017). These characteristics are similar to those of the rational style. The maladaptive styles are characterized by hypervigilance, buck passing and procrastination. Hypervigilance refers to an individual's impulsive approach (Halama, 2017) which is similar to the intuitive and spontaneous styles. Buck passing is characterized by a person's hesitation and leaving decisions and responsibility to another person or a group (Halama, 2017). This is similar to the dependent style. The prioritization of less important tasks or the preference of doing joyful activities and therefore postponing important tasks is typical for procrastination (Halama, 2017), making it similar to the avoidant style.

The similarities between these two approaches have led some authors to try combining different methods (Bavořár, 2018), although this approach has not yet been widely recognized. Decision-making styles have been studied in relation to a number of other concepts (e. g. personality traits). Over time, DMS became not just regarded as patterns reflecting habits and thought processes but also as general tendencies of self-evaluation and carrying out intentions (self-regulation) (Thunholm, 2004).

2.2 Quality of decisions

An important aspect of decision-making is the quality of the decision, which can be indicated by the results or outcomes of the decision as well as by the satisfaction with them (Geisler & Allwood, 2015). There is plenty of research looking at decisional outcomes. Generally, better decisions have been linked to higher levels of the rational and the intuitive styles as well as lower levels of the

avoidant and spontaneous styles (Baiocco et al., 2009; Bruine de Bruin et al., 2007). In cases where the Melbourne Decision-Making Questionnaire has been used, a positive relationship has been found between the quality of decisions and vigilance (which is similar to the rational style) (Dewberry et al., 2013). The adaptive and maladaptive strategies have been linked to other concepts related to the goal-attainment process, such as self-regulation.

3. The role of self-regulation in decision-making when attempting to reach a goal

In order to successfully achieve the goal that has been set, it is important for the individual to be able to adequately deal with distractions and temptations, as well as being able to actively focus their mental resources on the current task. This is action control, which along with other constructs falls under the self-regulation category (Thunholm, 2004). Self-control is the ability to have control over one's reactions to various stimuli. It is an important part of the general ability to apply control over one's internal states, processes, and behavior, i.e., self-regulation (Bavolár et al., 2021). This self-regulation is present throughout the whole goal-attainment process, during which it manifests itself in various ways. In a similar way to decision-making, it represents an important part of the process during which an individual tries to make good decisions when aiming for a specific goal. Given the relative lack of research which has focused on intertwining the complex display of decision-making and goal-attainment, it is possible to look at self-regulation as one of the links between these processes. The existing literature provides a basis for exploring this common ground in further research that could potentially lead to expanding related applicable knowledge.

3.1 Self-regulation and decision-making styles

Some literature has indicated the existence of a general relationship between the ability to self-regulate and specific decision-making styles. The rational style is said to be positively related to self-regulation and therefore individuals higher in the rational style tend to have fewer difficulties when using their ability to carry out their intentions (Thunholm, 2004). The intuitive and the spontaneous style does not seem to be linked to self-regulation very frequently. On the other hand, the dependent and the avoidant styles are said to be negatively related to the ability to self-regulate (Thunholm, 2004). Hence, it seems that the individuals who rely on the guidance of others or avoid making the decision altogether have an impaired ability to direct their goal-related behavior. The dependent style is then connected to having difficulties when carrying out deliberate activities because of distractive thoughts which overwhelm an individual's mind (Thunholm, 2004).

As previously mentioned, there are other typologies of DMS. Some authors have highlighted the positive relationship between self-regulation and the adaptive strategy, vigilance, as well as the negative relationship between self-regulation and all three maladaptive styles (Halama, 2017). Based on this, it can be assumed that there is a higher level of self-regulation in relation to decision-making based on rationality, as well as a lower level of self-regulation in relation to other ways of making decisions.

3.2 Self-regulatory strategies and decision-making

There have also been studies focused on self-regulation through specific strategies. Firstly, implementation intentions may pose as a source of self-regulatory effort. Besides regulating the decision-making process, they also contribute to its constructiveness, attention control and resistance to temptations and distractions (Halama, 2017). Previous findings have shown a greater tendency to form these intentions among people who are persistent, display adaptive perfectionism and prefer stereotypical situations (Bieleke & Keller, 2019). It seems that forming implementation intentions might help increase the chance of succeeding in achieving a goal and the whole goal-attainment process is accompanied by the individual's persistence. However, some

authors (Bieleke & Keller, 2019) have pointed out that this might happen at the expense of flexibility based on the interindividual differences in using these intentions as a self-regulatory strategy. The connection between implementation intentions and decision-making styles may be found when looking at the literature which focuses on relating these concepts to some personality traits. However, finding a direct relationship between implementation intentions and DMS has not yet been widely studied. Nonetheless, Bieleke and Keller (2019) have noted a link between implementation intentions and cognitive styles which are closely related to decision-making styles. According to Bieleke and Keller (2019), people that form implementation intentions are inclined to evaluate acquired information and various alternatives. These people have a higher tendency to form these intentions when compared to individuals inclined to rely on their intuition (Bieleke & Keller, 2019). Based on this, it can be assumed that individuals who use the rational style might have (in comparison to individuals with the intuitive style) a higher tendency to form implementation intentions as a self-regulatory strategy in the goal-attainment process. One study (Ďurbisová, 2020) has not only found a positive relationship between the rational style and one of the implementation intentions' characteristics, specificity (the degree of abstraction or concreteness), but also a negative relationship between this characteristic and the dependent and avoidant styles. These results indicate that individuals with the rational style may be inclined to form more concrete intentions, whereas individuals with the dependent and avoidant styles may tend to form more abstract intentions (Ďurbisová, 2020). This leads to a question of the success of the goal-attainment process in the case of individuals who tend to form very abstract intentions or not form them at all. It is however important to note that implementation intentions are just one of many self-regulatory strategies and therefore, while it may work in favor of individuals with the rational style, different strategies might be useful for other DMS.

Secondly, another link between decision-making and self-regulation can be the regulatory focus (Halama, 2017). The regulatory focus can influence decision-making through the preference and sensitivity towards a certain type of information. This relates to approaching or avoiding positive or negative stimuli. Some authors have expanded the understanding of the Regulatory Focus Theory into the context of decision-making, especially the area of sequential presentation of information, which is not often mentioned in the regulatory focus literature (Bullard et al., 2017). In a study where the information presented sequentially was evaluated by individuals with a different regulatory focus, it was found that people with the prevention focus had a tendency to wait for other information and possibilities which were presented later (Bullard et al., 2017). These individuals evaluated the possible alternatives presented among the first as worse than those presented later. Therefore, in comparison to individuals with the promotion focus, they were more inclined to explore a larger amount of alternatives and choose one that was not presented early on at the beginning of the sequence (Bullard et al., 2017). According to Bullard et al. (2017), this can speak to the holding-out effect where individuals who are unable to generate an external reference point at the beginning of a sequence (with which the next information would be compared to) may underestimate the alternatives presented among the first. These findings may provide an interesting way to investigate a link with specific decision-making characteristics such as the decision-making styles. Even when looking into the regulatory focus (based on its growth or safety orientation) a certain connection with some decision-making styles can be anticipated. The findings of different evaluations of sequentially presented information by individuals with various regulatory focus can help expand the possibilities of researching these connections. For example, it may be possible to assume a certain connection between the intuitive style and promotion focus or between the avoidant or even the dependent style and prevention focus.

3.3 Regulation of decision-making during goal attainment

The aforementioned and other forms of self-regulation (similar to decision-making) are connected to other important constructs that influence the goal-attainment process, such as self-esteem, and self-efficacy. In their efforts to research decision-making styles, some authors have focused on interindividual differences in evaluating different alternatives and paid special attention to where in this decision-making process these differences take effect. Galotti et al., (2006) have suggested that these differences may manifest themselves not as much in the way of acquiring and structuring the information as in a way the individual affectively reacts to the process itself and how they perceive their own approach towards this process. The findings highlight the differences which have manifested especially in the degree to which individuals think about the effect of the outcomes of their decisions on their future (Galotti et al., 2006). According to Galotti et al., (2006), interindividual differences may be seen and reflected not only during the first phase of the goal-attainment process but also during other phases, which generally get slightly less attention in this matter.

As some authors (Bavořár et al., 2021; Ďurbisová & Bavořár, 2021) have stated, there is a gap in the knowledge concerning the aspects of the decision-making process which accompany the individual stages of goal achievement. Current research looking at the possible importance of micro decisions taking place throughout the whole goal attainment process is lacking. However, recent research by Bavořár et al. (2021) has attempted to shed more light on this matter. One of their studies has included specific aspects of the decision-making process, e. g., momentary (in the current moment) decisions to make/not make changes in the intensity of effort, pace, demands on the goal, time length and manner of achievement. Other aspects were in the form of momentary decisions to continue or end the goal achievement process, or momentary deliberations about the benefits and costs related to continuing and ending this process. All these aspects could be considered manifestations of self-regulation, since they represent conscious ways of directing goal-oriented behavior through momentary thoughts and decisions of an individual. Since some of the aspects of the decision-making process have been repeatedly shown to be related to action crisis and selected goal characteristics (Bavořár et al., 2021; Ďurbisová & Bavořár, 2021), these results could appeal to a fresh research approach focusing on these processes through self-regulatory strategies.

These research studies are some of the few to focus on aspects of decision-making during goal attainment. Their novel approach might push further research in a fruitful direction, not only because of the found relationships, but also because of the relationships that were expected but not shown. As the authors (Bavořár et al., 2021) have stated, there is room for further exploration of these and other aspects of the decision-making process accompanying goal attainment.

Considering the importance of self-regulation in both processes, focusing on other specific ways individuals regulate their thoughts and behavior when making micro decisions to achieve the desired end state might provide further insight into the how and why of the (un)successfulness of a goal-directed behavior. Some of the self-regulatory strategies mentioned in this paper, such as implementation intentions or the regulatory focus, might be of similar use in researching decision-making and goal achievement. The exploration of momentary changes in planned steps to achieve a goal, or current need for safety or growth in relation to the goal and its challenges could provide even more information on this matter.

This could lead to enhancements in research methods, better understanding of these processes, and possibly end in specific strategies and training programs aimed at recognizing one's potential, their strengths and weaknesses, and finding more fulfilling and satisfying ways of reaching one's goal. Since decision-making and goal achievement are ever-present, learning such strategies could enrich all life areas and help ease both minor and major tasks people face. The findings of such

studies could be applied not only in work settings, but also in school or family counselling.

Conclusion

Both the decision-making and the goal-attainment processes have been the subject of research for years and have shown themselves to have an impact on the quality of many areas of life. However, considering the complexity of these concepts, it has become a challenge to conduct research that would sufficiently include all aspects of both processes. Yet, based on the existing literature, it is possible to find connections that would make it easier to bridge the gaps. One way is to take a look at these processes through self-regulation and its specific forms. The exploration of self-regulatory strategies preferred by individuals with different decision-making styles may provide insight into the steps taken in order to achieve a certain goal. When looking into the decision-making process without limiting it to specific decision-making styles, self-regulation may help even more in efforts to understand the changes and interindividual differences in decision-making and goal-achievement. Some of the recent studies provide a basis for further exploration of self-regulated decision-making during goal attainment. One possible way could be looking into micro decisions made by individuals through implementation intentions, regulatory focus and other self-regulatory strategies at different stages when attempting to reach a goal. The focus of this paper was therefore to discuss the potential of self-regulation in helping to deepen the understanding of interaction between the decision-making and the goal attainment processes, and to outline the possible applications of such knowledge.

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