

LITERATURE REVIEW

The cognitive, neural, and social aspects of regulatory mode and its implications on well-being and decision-making

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Regulatory mode theory distinguishes between two components, or modes, of effective self-regulation: locomotion and assessment. Locomotion refers to psychological state-to-state movement. Assessment refers to goal evaluation and means of goal achievement. The primary aim of this review is to synthesize the cognitive, neural, and social aspects and underpinnings of regulatory mode theory. This review also explores implications of regulatory mode theory on well-being and decision-making within and among groups and individuals. With an integrative research approach on the mechanisms and implications of regulatory mode theory across multiple domains and levels of analysis, we suggest new research directions by exposing lapses in the literature and by providing a foundation for novel explorations of regulatory mode theory.

Keywords: decision-making, well-being, regulatory mode, self-regulation, locomotion, assessment

People must often adjust their behaviors, emotions, and thoughts. The process by which these adjustments are made is called self-regulation. This process of self-regulation extends personal agency into the realms of affect, cognition, motivation, action, judgment, and behavior (Bandura, 1991). Regulatory mode theory describes modes of self-regulation with respect to motivation that pertain to the “how” of goal pursuit and is composed of locomotion (i.e., movement from psychological state-to-state) and assessment (i.e., evaluation of goals and the means of goal achievement; Higgins & Kruglanski, 1995; Kruglanski et al., 2000). Locomotion and assessment are part of the self-regulatory systems (Mischel, 1973) within a general architecture of personality (Cervone, 2004).

Locomotion and assessment are the two orthogonal, fundamental components that together compose the process of self-regulation. Assessment is involved with making comparisons and evaluations against a critical standard. Examples of these comparisons may be comparing goals and means for optimal achievement or comparing oneself to others or some standard. Assessment is fundamentally related to truth motivation, that is, the motivation to understand what is real (Kruglanski, Pierro, Mannetti, & Higgins, 2013). Individuals scoring high in assessment ask questions like “What should I do in the future?”, “How did I do in the past?”, “What are the best ways to achieve my goal?”, or “What are my alternatives?”.

Locomotion is involved in psychological state-to-state movement such as sustaining continuous movement in goal pursuit and initiating movement

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away from a current state. Locomotion is fundamentally related to control motivation, that is, the motivation to manage what happens (Kruglanski, et al., 2013). Those scoring high in locomotion simply want to effect movement in the direction of the goal, and these individuals prefer a movement away from the status quo even if the new state they are entering may be worse rather than better than their previous state (Kruglanski, Pierro, & Higgins, 2015). Locomotion emphasizes “just doing it” or “making something happen” instead of critical evaluation.

Regulatory mode theory posits that locomotion and assessment are functionally independent (Higgins, Kruglanski, & Pierro, 2003; Kruglanski et al., 2000). Locomotion and assessment are generally conceived as stable within the individual, but also as variables that can be induced by situational factors (Higgins et al., 2003; Pierro et al., 2000). Kruglanski et al. (2000) created two separate unidimensional, internally consistent, temporally stable scales to measure chronic individual differences in assessment and locomotion. An individual can differ chronically and temporarily in their preference for one mode over the other, also called their orientation. Because of locomotion and assessment’s independent nature, individuals may score high in one mode and low in the other, score high in both, or score low in both (Kruglanski et al., 2003). One’s orientation has notable implications for how one may approach and engage in decision-making and generally navigate the world. Assessment and locomotion also show interaction effects both within and between individuals both in terms of well-being and decision-making. The extent of this interaction and its context dependence is still in question.

Regulatory mode theory has been applied and analyzed in observational studies and experiments across various fields, but despite the extensive literature examining regulatory mode theory’s implications in the realms of decision-making and well-being, the cognitive and neural mechanisms and underpinnings of these implications are largely unexplored compared to the overwhelming amount of work done with regulatory mode in the field of social psychology. The primary goal of this review is to synthesize research on the cognitive, neural, and

social aspects of regulatory mode’s implications on decision-making and well-being to construct a comprehensive picture of the work already completed on the subject and reveal patterns that serve as the foundations for suggestions for new directions of research.

Personal/Social and Decision-making

Locomotors and assessors approach decision-making quite differently. Individuals high in one orientation and not the other also tend to have a different experience with the decision-making process. High locomotors value the experience of psychological movement from state to state in making decisions, whereas high assessors value making the right decision, which often involves a more extensive evaluation (Higgins & Kruglanski, 1995; Kruglanski et al., 2000). However, we need to consider many social and interpersonal factors when examining how the mechanism postulated by the regulatory mode theory affects decision-making. For example, people may make decisions differently based on whether or not they are in regulatory fit. Regulatory fit occurs when the manner of goal pursuit sustains the regulatory orientation instead of disrupting it and often results in the decision-maker feeling “right”. When high assessors experience regulatory fit, they are highly motivated to perceive their own biases, correct their own perceived biases, and are more likely than high locomotors to distrust the feeling of being right. High assessors may even overcorrect their own feelings of being right thereby reversing the intended effect of regulatory fit. That is, they may distrust the feeling of being right when in regulatory fit so much that they begin to believe that they are wrong in whatever decision-making task they are undergoing (Appelt, Zou, & Higgins, 2010).

Assessors tend to be externally motivated, and locomotors tend to be intrinsically motivated. The latter find pleasure in the change associated with the decision-making process and view time as a resource that must be conserved by acting quickly. Alternatively, assessors find reward in making the correct decision and have little concern with the amount of time it may take to decide (Pierro, Kruglanski, & Higgins, 2006; Kruglanski et al., 2015).

For example, those high in locomotion compared to those high in assessment show more intense and active job-seeking behavior, leading to more job interviews and job offers (Amato, Baldner, & Pierro, 2016). People high in locomotion appear less concerned with finding the right job than those high in assessment. In other words, high locomotors find pleasure in moving from the unemployed state to the employed state, regardless of whether or not the job is right for them.

Regulatory mode also seems to affect individuals' approach to goal pursuit. Assessors prefer means of goal pursuit that serve multiple goals at once, as opposed to means that serve only one primary goal (Orehek, Mauro, Kruglanski, & Van der Bles, 2012). Individuals in assessment self-regulation mode are concerned with making the best choice. They, therefore, favor the value generated by the possibility of pursuing multiple goals over the strength of the means' association with the goal. Individuals in a locomotion self-regulatory mode are concerned with progress and accordingly prioritize association strength over the value provided by multi-goal means (Orehek et al., 2012). Due to this prioritization, locomotors prefer means that serve only one primary goal because the means have a strong association with that goal.

Experience with the decision-making process differs for high assessors and high locomotors, so their performance tends to differ depending on the intricacy and task domain. Very simple tasks are more effectively carried out by individuals with high locomotion and low assessment concerns than those with high assessment concerns and low locomotion concerns (Chernikova et al., 2016). If the task is simple, there is no need for extensive evaluation of choices before decisions are made as there would be for complex tasks. Therefore, an individual with high assessment and low locomotion would be less effective in completing simple tasks than would someone with high locomotion and low assessment (Chernikova et al., 2016).

Different decision-making domains introduce similarly nuanced results about how regulatory mode affects task performance. For example, individuals who score high (vs. low) in locomotion tend to be

more willing to increase their retirement savings than individuals who score high (vs. low) in assessment while individuals who score high (vs. low) in both locomotion and assessment show, on average, the highest willingness to increase their retirement savings (Kim, Shin, Heath, Zhang, & Higgins, 2017). Additionally, individuals with high (vs. low) locomotion that also score moderately (vs. high or low) in assessment were more likely to have larger retirement wealth accumulated than those with low (vs. high) locomotion and any combination of assessment scores. In finance, this moderate assessment score is necessary because too much assessment may cause one to lose time-sensitive opportunities.

This moderate score would likely result in less auspicious outcomes in academic contexts in which being a high (vs. low or moderate) assessor is useful because academic measures such as school grade point average often depend heavily on being highly evaluative and getting the right answer (Kim, Franks, & Higgins, 2013). Obviously, effective decision-making in different settings innately requires different decision-making strategies depending on those settings. In academia, it pays off to be thoughtful and evaluative whereas in time-sensitive domains, like investment, the same thoughtfulness that serves one well in academia may be a hindrance. Regulatory modes are only one aspect of the decision-making process in any given context, and clearly some orientation levels are more likely to be successful in some domains than others.

Research has shown that high assessors' concern with making the right decision could lead them to lose favorable opportunities not only when outcomes are time-sensitive but also when their perception of value is affected by a previously missed opportunity. In retail, high assessors value their choices more if chosen from a large selection of possibilities (Mathmann, Chylinski, Ruyter, & Higgins, 2017a). However, the selection's value is also affected by previous opportunities. Mathmann, Chylinski, Ruyter, & Higgins, (2017b) found that high assessors were especially sensitive to missed opportunities. The larger the missed opportunity was, the less likely a high assessor was to commit to subsequent action in

pursuing the next opportunity presented. After a missed opportunity of high value, high assessors tend to perceive current opportunities as less valuable, whereas after a missed opportunity of small value, they perceive current opportunities as more valuable. This difference in value judgment is due to a comparison between the missed past opportunity and the present opportunity. After a small missed opportunity, high assessors may still reason that their current offer is quite valuable compared to their missed offer and that they have lost little (i.e., the small missed opportunity). After a large missed opportunity, high assessors may reason that their current offer is not as valuable and is undesirable compared to their past offer.

Aside from how task complexity and domain interact with regulatory mode to impact decision-making and performance, there is evidence that the phase of the decision-making process in which high assessment or high locomotion concerns are applied affect an individual's commitment to change (Scholer & Higgins, 2012). These phases are traditionally conceived as the deliberation phase and the goal pursuit phase. In the deliberation phase, the decision maker is concerned with evaluating the content of the decision to decide whether to commit to action or not. In the goal pursuit phase, the decision maker is actually taking some action to engage in movement toward some end-state. The specific concerns linked to these phases suggest that a motivational orientation relating to comparison and evaluation (i.e., assessment) would be most relevant to the deliberation phase, whereas a motivational orientation relating to movement (i.e., locomotion) would be most relevant to the goal pursuit phase. However, regulatory mode theory states that locomotion and assessment are functionally independent, so it is possible that both may be involved in either phase. Building on this knowledge, Scholer and Higgins (2012) investigated how an emphasis on locomotion in the deliberative phase affects decision makers' commitment to change. They found that a higher degree of locomotion (vs. a higher degree of assessment) in the deliberative phase of decision-making leads to an increased commitment to the choice and/or change. This

finding fits the current literature in that it is further evidence that locomotion facilitates psychological state-to-state movement.

It is evident that locomotion and assessment modes are not always at odds with one another. Both locomotion and assessment are necessary in tandem to facilitate effective action. This joint necessity, called complementarity, is observable in the required decision-making processes of task performance both within and across levels of analysis (Kruglanski et al., 2013). Within individuals, locomotion and assessment concerns have a positive interaction effect on work performance. This interaction suggests that people who are high in both dimensions will have higher performance compared to those high in just one dimension and not the other. In making decisions, those high in both dimensions are not only decisive but also highly evaluative of their choices thus leading to better performance (Pierro et al., 2012a).

Between individuals, Mauro, Pierro, Mannetti, Higgins, and Kruglanski (2009) found that there is a trade-off between speed and accuracy in task performance in groups composed either completely of locomotors or completely of assessors. In their study, assessor groups were more accurate than their locomotor counterparts while locomotors were faster than their assessor counterparts. Moreover, groups that were equal parts assessor and locomotor were as accurate as the all-assessor groups and as fast as the all-locomotor groups.

Pierro et al. (2012b) further expanded the concept of complementarity by applying a multilevel analysis. The effects of group complementarity on task performance were measured within four Italian organizations of differing trades. Each individual was rated by their supervisor based on their performance. Individuals were rated to have better performance when their group complemented their dominant regulatory mode orientation. The performance of individuals high in locomotion compared to assessment was better when their group's dominant regulatory mode orientation was assessment, and the performance of individuals high in assessment compared to locomotion was better when their group's dominant regulatory mode orientation was

locomotion.

While this study provides strong evidence to suggest that the individual's performance improves when their group complements their regulatory mode orientation, the only reference for the level of the individual's performance came from the individuals' immediate supervisor. This may not be the best measure of performance because, aside from any personal biases, there also exists a complementarity between leaders (e.g., supervisors) and subordinates. For example, subordinates with a strong assessment orientation (vs. a strong locomotion orientation) will be complemented by a leader perceived to have coercive power, which is the power to initiate action. Alternatively, subordinates with a strong locomotion orientation (vs. a strong assessment orientation) will be complemented by a leader perceived to have expert power, which is the power to inform and influence the subordinate toward evaluating alternatives (Hamstra, Orehek, & Holleman, 2014). In the study by Pierro et al. (2012b), the orientations of supervisors were not taken into account, and there were no other sources for performance ratings; thus, it is possible that complementarity between the individual and the supervisor accounted for some aspect of the performance differences among those in the group. This possible complementarity impact on the results would depend on whether or not the supervisor worked closely with their subordinates, but this information was not made available in the Pierro et al. (2012b) study.

Complementarity between leaders and subordinates, which serves to better performance, should not be confused with regulatory fit between leaders and subordinates, which serves to make subordinates in a work setting feel more engaged and satisfied (Benjamin & Flynn, 2006). While complementarity implies that the subordinate and the leader have different regulatory mode orientations, regulatory fit implies that the leader and subordinate share regulatory mode orientations or at least that the leadership style suits the regulatory mode orientation of the subordinate. Individuals who have a strong assessment orientation (vs. a strong locomotion orientation) prefer leaders with an

advisory or expert leadership style, which involve allowing the subordinate to be active in the evaluative process of decision-making and mirror the values of those with a high assessment orientation compared to a high locomotion orientation (Kruglanski, Pierro, & Higgins, 2007). Individuals with a strong locomotion orientation (vs. a strong assessment orientation) prefer directive and coercive leadership, which involves giving explicit instructions with particular standards and mirror the values of those higher in locomotion orientation compared to those higher in assessment orientation (Kruglanski et al., 2007).

Individuals differ in their subjective experience with the decision-making process, approach to goal pursuit, and approach to value depending on their regulatory orientation. However, other factors such as task intricacy, task domain, decision-making context, and phase of the decision-making process interact with both assessment and locomotion to create a complex picture of how regulatory mode theory fits into the current understanding of decision-making. Regulatory mode theory's role in current personality and social psychology literature as it relates to decision-making is also complex because locomotion and assessment often interact with one another. Regulatory fit and complementarity add yet another level of difficulty and intrigue to the study of regulatory mode theory, and there is still much more to be learned about them. For instance, more research is needed to examine the role of regulatory fit in the relationship between leaders and subordinates. Moreover, complementarity is almost exclusively studied in terms of high and low levels of locomotion and assessment. Complementarity based on moderate levels of assessment and locomotion are nearly absent from the literature. It is clear that although extensive research has been written already, there still remains a need for further investigation.

Personality/Social and Well-being

The Big Five personality traits have long been a staple of social psychology (John, Donahue, & Kentle, 1991; McCrae & Costa, 1987). Kruglanski et al. (2000) found that neuroticism and openness were both positively

related to assessment and were unrelated to locomotion. Inversely, extraversion and conscientiousness were positively related to locomotion but unrelated to assessment. Agreeableness was negatively associated with assessment by some measures, but this relationship was not replicable.

More recently, social and personality psychologists have conducted research to understand regulatory mode theory's relationship with the feelings of burnout, stress, psychological strain, and related behaviors of these negative feelings. This research has been done across numerous age groups spanning from high school students to adults in the workforce. Research using a sample of employees working at an Italian organization found that burnout, a state of mental or physical exhaustion due to prolonged stress, and psychological strain were negatively associated with locomotion and positively associated with assessment (De Carlo et al., 2014). In this study, multiple regression analyses also showed that workaholism, defined as the tendency to work excessively and compulsively, was positively associated with both locomotion and assessment.

De Carlo et al. (2014) expected locomotion to predict the tendency to work excessively because such a manner of work provides the opportunity to continue moving from task to task, which is preferred by locomotors. Locomotion was also expected to predict the tendency to work compulsively because such manner of work should provide locomotors with a sense of drive to keep moving forward with their goals. Assessment was expected to predict workaholism because assessors tend to make social comparisons that could result in the desire to keep up with others, further prompting them to work excessively and compulsively. Notably, work engagement, a positive affective state characterized by vigor, dedication, and absorption, was positively related to locomotion but negatively related to assessment. These relationships were expected given that locomotors display active engagement in their activities and are intrinsically motivated to pursue goals in order to engage in psychological movement. Conversely, assessors tend to be extrinsically

motivated and too preoccupied with their evaluations to become immersed in their activities.

Multiple mediation analyses in the De Carlo et al. (2014) study revealed that the effects of regulatory mode on burnout and psychological strain were mediated by workaholism and work engagement. In sum, locomotion and assessment both predict greater workaholism, which predicts greater burnout and psychological strain. Assessment predicts less work engagement, but locomotion predicts greater work engagement. This greater work engagement predicts less burnout and psychological strain.

Bélanger et al. (2016) describe withdrawal behavior as the collective term for actions intended to provide physical or psychological separation from something—in the case of their experiment, the workplace. In this study, descriptive statistics showed that locomotion was negatively associated with absenteeism, lateness, and early departure which are all withdrawal behaviors (Bélanger et al., 2016). In the same study, further examination of the data using multiple regression analyses showed that locomotion was a good predictor of absenteeism and lateness but not of early departures; however, the study used a small sample and small frame of prediction. More research to replicate these findings is needed and may illuminate any unseen mediators of this effect such as internal motivation. Further research should also be focused on investigating the relationship between withdrawal behavior and burnout.

Bélanger et al. (2015) furthered De Carlo et al.'s (2014) work on burnout in the workplace by incorporating the concept of passion into their study. Passion is an integral part of sustained psychological well-being (Vallerand, 2012). In their research, Bélanger et al. (2015) and Lucidi et al. (2016) integrated regulatory mode theory and the dualistic model of passion (Vallerand et al., 2003). The model distinguishes obsessive passion from harmonious passion. Obsessive passion refers to a controlled internalization of an activity in identity resulting in an internal pressure to participate in the activity. Controlled internalization occurs when one has accepted the activity as important for them because of personal or interpersonal pressure normally due to certain contingencies attached to the activity such as

feelings of high self-esteem or social acceptance. Harmonious passion refers to the autonomous internalization of an activity in an individual's identity resulting in pleasure from participation in the activity. Autonomous internalization occurs when one has freely accepted the activity as important to them with little or no contingencies attached to it. Bélanger et al. (2015) and Lucidi et al.'s (2016) results showed that locomotion was positively associated with harmonious passion, and assessment was positively associated with obsessive passion. Bélanger et al. (2015) further argue that locomotion is positively associated with harmonious passion because locomotion increases experiential involvement and, therefore, the experience of intrinsic and autonomous motivation.

Bélanger et al. (2015) found that locomotion was negatively correlated with workers' stress and burnout, and this effect was mediated by harmonious passion because harmonious passion promotes flexible task engagement and minimizes negative affect. The authors posit that assessment is positively associated with obsessive passion because assessment increases the likelihood of interpreting one's actions as a means to an end, thus it increases the experience of extrinsic and non-autonomous motivation. Their research shows assessment was positively associated with workers' stress and burnout, and this effect was mediated by obsessive passion.

Bélanger et al. (2015) also investigated the relationship between burnout and regulatory mode in the academic context, and their findings were supported by Zhang et al. (2015). Both teams of researchers found that while assessment was negatively associated with academic engagement, it was positively associated with burnout in students in the form of exhaustion and withdrawal. Alternatively, locomotion was positively associated with academic engagement and negatively associated with burnout in students.

Students' academic achievement and well-being in relation to their regulatory mode orientation has been explored, and these studies add nuance to the studies of Bélanger et al. (2015) and Zhang et al. (2015). In one study, 160 students of varying social

backgrounds from two Swedish high schools were enrolled as participants (Garcia et al., 2015). The official grades for the students in Swedish, mathematics, English, and physical education along with completed questionnaires on exercise behavior, psychological well-being, subjective well-being, and self-regulation were obtained. Psychological well-being was determined by measuring several constructs such as self-acceptance, autonomy, tolerance, and goal-directed behavior. On the other hand, high subjective well-being was defined as having high levels of positive affect and low levels of negative affect. The researchers found that academic achievement was positively correlated with assessment, psychological and subjective well-being, and frequent and intensive exercise behavior.

Also, assessment was negatively related to psychological and subjective well-being. Locomotion was positively associated with psychological and subjective well-being and exercise behavior, which increased academic achievement. Garcia et al. (2015) posit that assessment's negative correlation with well-being in this study may be explained by high achieving pupils' ruminating about the quality of their academic performance, which may lead to unhappiness. Notably, some researchers (e.g., Bélanger et al., 2015; Garcia et al., 2015; Zhang et al., 2015) assert that academic achievement has a positive correlation with assessment. Still, academic engagement, which was measured by evaluating the energy students invested in studying, the purpose the students had in studying, and the extent to which the student was engrossed in their studies, had a negative correlation with assessment.

Eniko and Stefan (2016) found that locomotion was positively correlated with academic performance, but assessment was not correlated with academic performance. Academic performance in this study was measured by the scholastic achievement of college students in Romania through high school GPA, Baccalaureate scores, current college semester's GPA, scholarship awards, and the number of failed exams. Eniko and Stefan's (2016) findings are clearly contradictory to Garcia et al.'s (2015) findings that assessment and academic achievement were positively associated. There may be some cultural

difference between the participant pools of the two studies or some other factor to account for this controversial result. Replication of these studies may provide clarity on the matter.

Locomotion is correlated with positive psychological and subjective well-being, but beyond this, locomotors (vs. assessors) also are more likely to flatter themselves (Komissarouk, Chernikova, Kruglanski, & Higgins, 2019). Self-flattery is defined as holding and reporting to others an unjustifiably high opinion of oneself. This is different from just allowing oneself to believe in their own unjustifiably high qualities or abilities without reporting to others, which is self-deception. Self-flattery is also different from simply trying to have others hold a high opinion of oneself regardless of one's own opinion, which is impression management.

Again, locomotion and self-flattery were positively associated, and assessment and self-flattery were negatively associated. Komissarouk et al. (2019) assert that these associations were mediated by locomotors' low and assessors' high self-criticism. Assessors do not flatter themselves because of their high self-criticism and concern for the truth. Their self-criticism and concern for the truth lower their self-esteem and also prevent them from engaging in impression management and self-deception. On the other hand, locomotors have a low propensity for high self-criticism, and this causes their self-esteem to be high. When locomotors exaggerate their positive qualities through unrealistically high self-esteem, they are engaging in self-deception rather than impression management. When not exaggerating, they are reducing self-deception, but again, not engaging in impression management.

Self-flattery is often an integral part of the lives of narcissistic individuals. Boldero, Higgins, and Hulbert (2015) mention the two manifestations of narcissism widely discussed in previous studies: grandiosity (i.e., associated with feeling superior to others) and vulnerability (i.e., associated with feelings of incompetency). Research investigating grandiosity and vulnerability's relations with regulatory mode revealed that grandiosity has a positive relation with assessment and locomotion. Vulnerability positively relates to assessment but is unrelated to locomotion

(Boldero et al., 2015; Hanke, Rohmann, & Förster, 2019). Both grandiosity and vulnerability have a positive relationship with hyper-competitiveness, which includes an aspect of being critical of others. Thus, the positive relationship that both grandiosity and vulnerability share with assessment makes sense given that assessment is heavily implicated in making social comparisons. On one hand, grandiosity is associated with placing more importance on achieving one's goals than on getting along with others (Morf & Rhodewalt, 2001), so its positive relation with locomotion, which is implicated in progressive psychological motion, is understandable. On the other, the hypersensitivity associated with vulnerability (Dickinson & Pincus, 2003) likely inhibits effective goal pursuit, hence the lack of association with locomotion.

Assessment mode's relationship with social comparison is well exhibited in narcissistic individuals, but, beyond social comparison, assessment is also positively associated with focusing on past adverse events and, consequently, counterfactual thinking (Choy & Cheung, 2018; Pierro et al., 2008). Pierro et al. (2008) describe counterfactual thinking as thinking about "what might have been" and therefore describe regret as a counterfactual emotion. Pierro et al. (2008) found that counterfactual thinking and regret were both negatively associated with locomotion and positively associated with assessment. There was no interaction found between locomotion and assessment, so each of these orthogonal modes affects the amount of counterfactual thinking and regret experienced by an individual. Counterfactual thinking facilitates making comparisons and thus is more readily engaging for high assessors, but for high locomotors, such comparison-making impedes continuous movement from one state to another. Pierro et al. (2008) also note that, for high assessors, counterfactual thinking is not utilized for self-improvement but rather as a means to better the decision-making process.

Not only are high assessors more likely to experience regret, but they are also less likely to forgive themselves for whatever behavior they regret. Pierro, Pica, Giannini, Higgins, and Kruglanski (2018) explain that individuals with a strong locomotion

orientation are more inclined to self-forgiveness while individuals with a strong assessment orientation are likely to refrain from self-forgiveness. Pierro et al. (2018) further assert that these inclinations are due to the fact that individuals with a strong locomotion orientation are more likely to focus on the future because of their desire to experience movement and change. Individuals with a strong assessment orientation are more likely to focus on the past due to their evaluative tendencies, keeping them from moving on.

Overall, these findings on regret and self-forgiveness seem to describe a gloomy experience for high assessors. On the other hand, high locomotors are not as likely as high assessors to fall into a sense of hopelessness. Locomotion is negatively associated with hopelessness, and the hopelessness experienced by locomotors partially mediated the positive relationship between locomotion and psychological well-being (Di Santo, Baldner, Pierro, & Kruglanski, 2018). One's ability to find meaning and purpose in life is crucial in life satisfaction, and locomotors appear to have the advantage in this.

A sense of life purpose is positively predicted by locomotion and negatively predicted by assessment with no interaction between locomotion and assessment found. This sense of purpose mediated the link between self-reflection and life satisfaction (Vazeou-Nieuwenhuis, Orehek, & Scheier, 2017). These results suggest that a sense of purpose may derive from movement and support the implication that purpose arises from action that carries meaning. Notably, the findings of Vazeou-Nieuwenhuis et al. (2017) contradict the findings of Hong, Tan, and Chang (2004), who found that an interaction between locomotion and assessment predicted life satisfaction: high locomotion and low assessment positively predicting life satisfaction. Vazeou-Nieuwenhuis et al. (2017) found no evidence for this interaction effect. However, the participants of Vazeou-Nieuwenhuis et al.'s (2017) study were American, and those of Hong et al. (2004) study were ethnically Chinese living in Singapore, so cultural differences between the samples of these two conflicting studies may explain this discrepancy.

Regulatory mode theory clearly has broad implications for individuals' well-being in myriad ways, but it is also involved in the well-being of interpersonal relationships. In research on romantic relationships, Kumashiro, Rusbult, Finkenauer, & Stocker (2007) found that partner affirmation, movement toward the ideal self, and couple well-being were all positively associated with locomotion and negatively associated with assessment. Moreover, in this study, locomotors were both more likely to elicit affirmation from their partners, give affirmation to their partner, and be receptive to their partner's encouragement, which all mediate the relationship between locomotion and partner well-being. In contrast, assessors elicit less affirmation from their partner, give less affirmation to their partner, and are more likely to be unreceptive to their partner's encouragement, which moderates the relationship between assessment and couple well-being.

A romantic or platonic relationship's well-being is also probably related to how well conflict between parties is resolved. Understandably, locomotion is positively correlated with the desire for interpersonal conflict resolution (Webb, Coleman, Rossignac-Milon, Tomasulo, & Higgins, 2017). Locomotors do not like disruptive conflict and are more likely to try to resolve conflict. In Webb et al.'s (2017) study, locomotors were more likely to perceive an interpersonal conflict as resolvable. Locomotion predicts higher reconciliation motives, but it does so independently of the difference in negativity experienced in the conflict.

Locomotors and assessors also tend to approach interpersonal relationships differently in the way that they offer support to others. Cavallo, Zee, and Higgins (2016) found that assessors give less support overall to those they are trying to help than locomotors do, but this may be due to the finding that assessors are more likely to tailor their support efforts by only offering support that addressed the specific motivational concerns of the individual being helped and refraining from offering superfluous support. On the other hand, locomotors are more likely to offer both motivationally tailored support and support that does not specifically address the

individual's needs.

Regulatory mode plays an important role in both social and personal well-being. In regard to interpersonal interactions, it can predict how an individual approaches romantic relationships, resolves conflict, and offers support. Research supports the notion that high locomotors are perhaps better equipped to navigate interpersonal relationships than high assessors, but it also suggests that high locomotors are more likely than high assessors to engage in behaviors that protect their psychological and subjective well-being. Because of this, they are less likely than high assessors to suffer from burnout in workplace and academic settings and more likely to find meaning in life, look forward to the future, and forgive themselves. However, high assessors are less likely than high locomotors to engage in self-deception and self-flattery. In sum, the present studies suggest that well-being is often negatively impacted by a strong assessment orientation while a strong locomotion orientation seems to be quite important in bolstering well-being.

Cognition/Neuroscience and Decision-making

The cognitive and neural aspects of the relationship between regulatory mode theory and decision-making offer insight into what may account for the linkages between behavior and regulatory mode theory. Investigating risk-taking behavior, Panno, Pierro, and Lauriola (2014) suggest that an individual's time horizon—which is broadly defined as how far in the future one plans ahead (Bluedorn, 2002)—has a mediating effect on assessors. They tend to take fewer risks and evaluate options against critical standards the longer the time horizon. Locomotors are more likely to engage in a task for the sake of the task itself and not for any future goal.

Furthermore, in a series of three experiments using participants both with chronic and induced regulatory modes, Panno, Lauriola, and Pierro (2015) again found that individuals with either an induced or chronic assessment mode (vs. an induced or chronic locomotion mode) take fewer risks. However, they also found that this reduced risk-taking is

mediated by an increase in anticipated regret of the risk's possible outcome. At first, research suggested that locomotion was not related to an increase in risk-taking (Panno et al., 2014); however, in a subsequent line of research, Panno et al. (2015) found that those chronically predisposed to locomotion orientation (vs. chronic assessment orientation) are more likely to take greater risks due to a decreased level of anticipated regret only when the risk task evoked emotional arousal triggering affective and dynamic dimensions of risk-taking. An example of such a task would be the hot version of the Columbia Card Task which gives immediate feedback about the participants' choices thus triggering affective dimensions such as tension, excitement, and regret. The perception of these critical affective dimensions is key to the risk-taking behavior of locomotors.

Perception seems to be a highly relevant component of the relationship between regulatory mode theory and decision-making. Research suggests that perceived value experienced from how a decision is made can transfer to the value of the outcome itself when there is regulatory fit in the decision-making process (Avnet & Higgins, 2003). In their study, Avnet and Higgins (2003) induced participants' regulatory mode orientation and asked them to select one reading light from a collection of several by using either a strategy of full evaluation (assessment) or a strategy of progressive elimination (locomotion). When the strategy fit the participant's regulatory mode orientation, they were willing to pay 40% more for the reading light that they had selected than when the strategy did not fit the regulatory mode orientation.

Furthermore, research suggests that the perception of value has a temporal element that differs in strength for assessors and locomotors. Guo and Feng (2015) used resting-state fMRI to investigate whether functional connectivity could reflect regulatory mode's influence of delay discounting, the degree of preference for small, immediate rewards over large, delayed ones. In their study, behavioral results indicated that delay discounting was negatively correlated with assessment scores and positively associated with locomotion scores, and neuroimaging indicated that

functional connectivity between the lateral prefrontal cortex (LPFC) and the ventromedial prefrontal cortex (vmPFC) was negatively correlated with assessment scores and positively correlated with locomotion scores.

Critically, mediation analysis showed that LPFC-vmPFC functional connectivity mediated the effect of regulatory mode on delay discounting. Research in delay discounting has shown that blood-oxygen-level-dependent (BOLD) activity in the vmPFC correlates with the subjective value of options being considered (Guo & Feng, 2015; Kable & Glimcher, 2007, 2010), and the represented values in the vmPFC are subject to top-down modulation by the LPFC (Figner et al., 2010; Guo & Feng, 2015; Hare, Camerer, & Rangel, 2009). These results suggest that individual differences in delay discounting can be predicted by regulatory mode orientation. Assessors prefer a large delayed reward to a small immediate one, but locomotors prefer a small immediate reward to a large delayed one. For locomotors, there is a greater diminishment in the value of the reward based on the delay of its receipt than there is for assessors.

Apart from discount delay, a large amount of research has focused on regulatory mode's role in procrastination. Choy and Cheung (2018) found that procrastination was negatively associated with locomotion scores and positively associated with assessment scores. They also found that negative affective states mediated the relationship between regulatory mode and procrastination, internal sense of control, and negative past and future time perspectives. These findings suggest that affective and cognitive links between regulatory mode and procrastination may account for the behavioral links between regulatory mode and procrastination. Cognitively, participants with a high assessment orientation (vs. high locomotion orientation) showed prominent temporal focusing on the negative past. In contrast, participants with a high locomotion orientation (vs. high assessment orientation) showed a temporal focus in the past but especially in the future. Affectively, participants with a high assessment orientation (vs. high locomotion orientation) were more inclined to feel negative emotions. Participants with a high locomotion

orientation (vs. high assessment orientation) showed a tendency to experience positive emotions (Choy & Cheung, 2018). Moreover, in this experiment, locus of control, which refers to the degree to which one views outcomes as contingent upon internal characteristics instead of external forces, was positively associated with locomotion and negatively associated with assessment. However, replicating these findings would be useful as Choy and Cheung (2018) only used a self-reported one-time measure of procrastination with a convenience sample.

The neural substrates of procrastination and the mediating effects of regulatory mode have also been investigated. Neuroimaging performed by Zhang, Ni, and Feng (2017) indicated that assessment scores were negatively associated with functional connectivity between the parahippocampal cortex (PHC) and the dorsal anterior cingulate cortex (dACC). The PHC supports episodic and semantic prospection, and increased episodic prospection is correlated with procrastination (Liu, Feng, Chen, & Li, 2013; Race, Keane, & Verfaellie, 2013; Schacter, Addis, & Buckner, 2007; Zhang, Wang, & Feng, 2016). The dACC is crucial in the process of cognitive monitoring of goal-directed behavior and focusing attention (MacDonald, Cohen, Stenger, & Carter, 2000; Posner & DiGirolamo, 1998; Weissman, 2005).

Locomotion scores were negatively correlated with functional connectivity between the anterior prefrontal cortex (aPFC) and the PHC. Some research has shown that the aPFC could be implicated in exertion of cognitive and emotional control to aid in focusing on future goals. The aPFC is able to inhibit procrastination by suppressing activity in the Default Mode Network in regions such as the posterior cingulate cortex and anterior medial prefrontal cortex (Kühn, Haggard, & Brass, 2014; Volman, Roefolfs, Koch, Verhagen, & Toni, 2011; Zhang et al., 2016). Mediation analysis indicated that PHC-dACC functional connectivity and aPFC-PHC functional connectivity, respectively, mediate the different effects of assessment and locomotion regulatory modes on procrastination.

Individuals with an assessment mode orientation are more likely to engage in recalling the past and imagining the future (Pierro et al., 2008) because their

strategy of decision-making involves evaluating past and imagined future actions against critical standards (Kruglanski et al., 2000; Pierro et al., 2008; Pierro, Giacomantonio, Pica, Kruglanski, & Higgins, 2011). Therefore, high assessment (vs. low assessment) may involve hyperactivity in episodic memory and episodic prospection regions of the brain (Zhang et al., 2017). High locomotion (vs. low locomotion) does not involve reflection on the past and instead drives individuals to move on to the next goal pursuit quickly and is positively correlated with resistance to distraction and self-maintenance mediated by high intrinsic motivation (Higgins et al., 2003; Kruglanski et al., 2000; Pierro et al., 2008). Thus, high locomotion (vs. low locomotion) should be positively associated with volition inhibition, which is reflected by hyperactivity in the PFC, and negatively associated with episodic memory and episodic prospection, which is reflected by decreased activity in episodic-related brain regions (McClure, Laibson, Loewenstein, Cohen, & 2004; Pierro et al., 2008; Volman et al., 2011; Zhang et al., 2017).

In general, assessors tend to take fewer risks, be less likely to engage in delay discounting, and be more likely to procrastinate than locomotors. Through investigations of delay discounting and procrastination, researchers have observed other important relations such as locomotion's positive association with locus of control, hyperactivity in the PFC, and focus on the future. Conversely, assessment was negatively associated with locus of control and focus on the future. The literature of neuroscientific and cognitive analysis of regulatory mode theory in regard to decision-making has focused mainly on delay discounting and procrastination, but these areas of study have been useful as foundations for research on the neural substrates of regulatory modes.

Cognition/Neuroscience and Well-being

The relationship between regulatory mode theory and cognitive and neural aspects of well-being is not well understood but could offer valuable information about the relationship between motivation and physical and psychological health. Recent research

has shown that individuals suffering from Parkinson's disease experience a decrease in assessment motivation but no changes in locomotion motivation, suggesting that Parkinson's disease leads to a diminished tendency to critically evaluate outcomes (Foerde, Braun, Higgins, & Shohamy, 2015). Moreover, this same research notes that lower assessment scores were correlated with poorer performance on a feedback-learning task that had been previously shown to rely on the striatum. Foerde et al. (2015) assert that the link between differences in assessment scores in patients with Parkinson's disease and the known impairment of feedback-based learning associated with the disease could connect assessment motivation to phasic dopamine signals that are also crucial in the striatum to facilitate learning.

Apart from the physical implications of regulatory mode theory, there has also been research implicating regulatory mode in mental health. Cornwell, Franks, and Higgins (2016) suggest that well-being is dependent on maximizing effectiveness in satisfying specific motives as well as ensuring that motives are cooperative such that no one motive is too weak or too strong. With this view of motives' role in well-being, Cornwell et al. (2016) have linked several forms of psychological distress with specific types of motivational dis-integration. They argue that weak motivations are not effective as necessary constraints on other motivations, which may lead to maladaptive behaviors when left unchecked.

With its characteristic association with critical evaluation, assessment mode is heavily concerned with the motive of truth and is positively correlated with narcissistic grandiosity and narcissistic vulnerability (Boldero et al., 2015). Cornwell et al. (2016) argue that the unconstrained concern for the truth leads to excessive social comparison. The authors also suggest that disproportionately strong assessment motives inhibit the function of other motives related to locomotion by either engaging them too much in the pursuit of assessment goals or by disengaging them. They further assert that because previous research on narcissism has found that narcissism is negatively associated with both attentional control and self-control (Claes,

Vertommen, Smits, & Bijteebier, 2009; Wink & Gough, 1990), narcissism is associated with weak locomotion. Locomotors are concerned with maintaining control and uninterrupted movement; therefore, assessment mode dominates other motivations and likely leads to their dysfunction in service of assessment in narcissistic individuals.

However, assessment mode's strong association with critical evaluation and concern with the truth is certainly not always detrimental to well-being and may help overcome addiction. In their research investigating the roles of regulatory mode theory and action control in cigarette addiction, Ravis, Sheeran, and Armitage (2010) explain that numerous studies have suggested that the extent to which intention guides behavior depends on whether the behavior is habitual or not. Past behavior provides a direct prediction of future behavior. Notably, assessors are less prone to habitual control of behavior than non-assessors. Past behavior is a less reliable predictor of future behavior for assessors than it is for non-assessors (Ravis et al., 2010). Importantly, there were moderator effects of assessment on the habitual mode of action control in this study, but no moderator effects were found for locomotion.

Discussion

Empirical studies reveal that assessment is positively correlated with fear of invalidity, discomfort with ambiguity, neuroticism, low self-esteem, and negative mood (Kruglanski et al., 2000; Pierro, Chernikova, Lo Destro, Higgins, & Kruglanski, 2018; Pierro et al., 2018). Locomotion is positively correlated with psychological vitality, self-esteem, optimism, and being decisive, and it negatively correlates with social anxiety and depression (Kruglanski et al., 2000; Pierro et al., 2018; Pierro et al., 2018). Assessors are more likely to experience nostalgia and suffer more from counterfactual thinking (Pierro et al., 2008; Pierro, Pica, Klein, & Higgins, 2013; Pierro et al., 2018). However, these important associations likely have some correlation to childhood and adolescent development, but no studies to date have been published on the development of regulatory mode orientation in children.

It is possible that lack of sufficient feedback from caretakers led to uncertainty in decision-making, thus leading to a strong desire for correctness, which is the hallmark of a strong assessor. This hypothesis is consistent with current clinical theories of parental neglect outcomes (Boldero et al., 2015), but future research should focus on identifying factors in children that contribute to the development of one's regulatory mode orientation.

There is also a lack of cognitive neuroscientific research on regulatory mode, specifically in relation to well-being. Future research on the development of regulatory mode orientations would greatly benefit from further studies on the role of specific brain regions in regulatory mode.

Large gaps also exist in the literature in regard to cultural variability. Most of the current studies have been carried out in western, educated, industrialized, rich, democratic countries with few exceptions such as China. Future research should examine the effects of culture on regulatory mode and regulatory mode orientation development. This may be in the form of novel studies, but several replications of previous studies with varying samples from different cultural backgrounds would provide clarity for conflicting findings (e.g., Eniko & Stefan, 2016; Zhang et al., 2015).

Conclusion

The aim of this review was to describe and synthesize studies pertaining to the cognitive, neural, and social aspects and underpinnings of the regulatory mode theory and to explore the implications of regulatory mode theory on wellness and decision making across multiple levels of analysis. By highlighting inconsistent findings and synthesizing the mechanisms and implication of regulatory mode across several domains, this review serves to guide future studies for further exploration of regulatory mode theory.

Conflicts of Interest

The author has no conflicts of interest to declare.

References

- Amato, C., Baldner, C., & Pierro, A. (2016). "Moving" to a job. The role of locomotion in job search and (Re)employment.

- Personality and Individual Differences*, 101, 62–69.
<https://doi.org/10.1016/j.paid.2016.05.060>
- Appelt, K. C., Zou, X., & Higgins, E. T. (2010).** Feeling right or being right: When strong assessment yields strong correction. *Motivation and Emotion*, 34(3), 316–324.
<https://doi.org/10.1007/s11031-010-9171-z>
- Avnet, T., & Higgins, E. T. (2003).** Locomotion, assessment, and regulatory fit: Value transfer from “how” to “what.” *Journal of Experimental Social Psychology*, 39(5), 525–530.
[https://doi.org/10.1016/s0022-1031\(03\)00027-1](https://doi.org/10.1016/s0022-1031(03)00027-1)
- Bandura, A. (1991).** Social cognitive theory of self-regulation. *Organizational Behavior and Human Decision Processes*, 50(2), 248–287. [https://doi.org/10.1016/0749-5978\(91\)90022-L](https://doi.org/10.1016/0749-5978(91)90022-L)
- Bélanger, J. J., Pierro, A., Kruglanski, A. W., Vallerand, R. J., De Carlo, N., & Falco, A. (2015).** On feeling good at work: The role of regulatory mode and passion in psychological adjustment. *Journal of Applied Social Psychology*, 45(6), 319–329.
<https://doi.org/10.1111/jasp.12298>
- Bélanger, J. J., Pierro, A., Mauro, R., Falco, A., De Carlo, N., & Kruglanski, A. W. (2016).** It’s about time: The role of locomotion in withdrawal behavior. *Journal of Business and Psychology*, 31(2), 265–278. <https://doi.org/10.1007/s10869-015-9409-6>
- Benjamin, L., & Flynn, F. J. (2006).** Leadership style and regulatory mode: Value from fit? *Organizational Behavior and Human Decision Processes*, 100(2), 216–230.
<https://doi.org/10.1016/j.obhdp.2006.01.008>
- Bluedorn, A. C. (2002).** *The human organization of time: Temporal realities and experience*. Stanford, CA: Stanford University Press.
- Boldero, J. M., Higgins, E. T., & Hulbert, C. A. (2015).** Self-regulatory and narcissistic grandiosity and vulnerability: Common and discriminant relations. *Personality and Individual Differences*, 76, 171–176.
<https://doi.org/10.1016/j.paid.2014.12.019>
- Cavallo, J. V., Zee, K. S., & Higgins, E. T. (2016).** Giving the help that is needed: How regulatory mode impacts social support. *Personality and Social Psychology Bulletin*, 42(8), 1111–1128.
<https://doi.org/10.1177/0146167216651852>
- Cervone, D. (2004).** The architecture of personality. *Psychological Review*, 111(1), 183–204. <https://doi.org/10.1037/0033-295x.111.1.183>
- Chernikova, M., Destro, C. L., Mauro, R., Pierro, A., Kruglanski, A. W., & Higgins, E. T. (2016).** Different strokes for different folks: Effects of regulatory mode complementarity and task complexity on performance. *Personality and Individual Differences*, 89, 134–142. <https://doi.org/10.1016/j.paid.2015.10.011>
- Choy, E. E. H., & Cheung, H. (2018).** Time perspective, control, and affect mediate the relation between regulatory mode and procrastination. *PLoS ONE*, 13(12): e0207912.
<https://doi.org/10.1371/journal.pone.0207912>
- Claes, L., Vertommen, S., Smits, D., & Bijttebier, P. (2009).** Emotional reactivity and self-regulation in relation to personality disorders. *Personality and Individual Differences*, 47(8), 948–953.
<https://doi.org/10.1016/j.paid.2009.07.027>
- Cornwell, J. F. M., Franks, B., & Higgins, E. T. (2016).** Distress from motivational dis-integration: When fundamental motives are too weak or too strong. In Simpson E. & Balsam P. (Eds.), *Behavioral Neuroscience of Motivation* (Vol. 27, p. 547–568). Springer, Switzerland: Springer International Publishing.
- De Carlo, N. A., Falco, A., Pierro, A., Dugas, M., Kruglanski, A. W., & Higgins, E. T. (2014).** Regulatory mode orientations and well-being in an organizational setting: The differential mediating roles of workaholism and work engagement. *Journal of Applied Social Psychology*, 44(11), 725–738.
<https://doi.org/10.1111/jasp.12263>
- Di Santo, D., Baldner, C., Pierro, A., & Kruglanski, A. W. (2018).** A “bridge” over troubled water: Implications of the effect of locomotion mode on hopelessness. *Journal of Applied Social Psychology*, 48(12), 675–682. <https://doi.org/10.1111/jasp.12557>
- Dickinson, K. A., & Pincus, A. L. (2003).** Interpersonal analysis of grandiose and vulnerable narcissism. *Journal of Personality Disorders*, 17(3), 188–207.
<https://doi.org/10.1521/pedi.17.3.188.22146>
- Eniko, M. E., & Stefan, S. (2016).** The role of regulatory mode profile in academic achievement: What fosters success in higher education? *Transylvanian Journal of Psychology*, 17(2), 227–245. Retrieved from <http://epsz.pszichologia.psiedu.ubbcluj.ro/archive/20162/6.pdf>
- Figner, B., Knoch, D., Johnson, E. J., Krosch, A. R., Lisanby, S. H., Fehr, E., & Weber, E. U. (2010).** Lateral prefrontal cortex and self-control in intertemporal choice. *Nature Neuroscience*, 13(5), 538–539. <https://doi.org/10.1038/nn.2516>
- Foerde, K., Braun, E. K., Higgins, E. T., & Shohamy, D. (2015).** Motivational modes and learning in Parkinson’s disease. *Social Cognitive and Affective Neuroscience*, 10(8), 1066–1073.
<https://doi.org/10.1093/scan/nsu152>
- Garcia, D., Jimmefors, A., Mousavi, F., Adrianson, L., Rosenberg, P., Archer, T. (2015).** Self-regulatory mode (locomotion and assessment), well-being (subjective and psychological), and exercise behavior (frequency and intensity) in relation to high school pupils’ academic achievement. *PeerJ* 3:e847.
<https://doi.org/10.7717/peerj.847>
- Guo, Y., & Feng, T. (2015).** The mediating role of LPFC–vmPFC functional connectivity in the relation between regulatory mode and delay discounting. *Behavioural Brain Research*, 292, 252–258.
<https://doi.org/10.1016/j.bbr.2015.06.035>
- Hamstra, M. R., Orehek, E., & Holleman, M. (2014).** Subordinate regulatory mode and leader power: Interpersonal regulatory complementarity predicts task performance. *European Journal of Social Psychology*, 44(1), 1–6. <https://doi.org/10.1002/ejsp.1992>
- Hanke, S., Rohmann, E., & Förster, J. (2019).** Regulatory focus and regulatory mode – Keys to narcissists’ (lack of) life satisfaction? *Personality and Individual Differences*, 138, 109–116.
<https://doi.org/10.1016/j.paid.2018.09.039>
- Hare, T. A., Camerer, C. F., & Rangel, A. (2009).** Self-control in decision-making involves modulation of the vmPFC valuation system. *Science*, 324(5927), 646–648.
<https://doi.org/10.1126/science.1168450>
- Higgins, E. T., & Kruglanski, A. W. (1995).** A theory of regulatory modes: When locomotion versus assessment is emphasized. Unpublished manuscript
- Higgins, E. T., Kruglanski, A. W., & Pierro, A. (2003).** Regulatory mode: Locomotion and assessment as distinct orientations. *Advances in Experimental Social Psychology*, 35, 293–344.
[https://doi.org/10.1016/s0065-2601\(03\)01005-0](https://doi.org/10.1016/s0065-2601(03)01005-0)
- Hong, R. Y., Tan, M. S., & Chang, W. C. (2004).** Locomotion and assessment: self-regulation and subjective well-being. *Personality and Individual Differences*, 37(2), 325–332.
<https://doi.org/10.1016/j.paid.2003.09.006>
- John, O. P., Donahue, E. M., & Kentle, R. L. (1991).** Big Five

- Inventory (BFI). APA PsycTests. <https://doi.org/10.1037/t07550-000>
- Kable, J. W., & Glimcher, P. W. (2007).** The neural correlates of subjective value during intertemporal choice. *Nature Neuroscience*, *10*(12), 1625–1633. <https://doi.org/10.1038/nn2007>
- Kable, J. W., & Glimcher, P. W. (2010).** An “as soon as possible” effect in human intertemporal decision making: Behavioral evidence and neural mechanisms. *Journal of Neurophysiology*, *103*(5), 2513–2531. <https://doi.org/10.1152/jn.00177.2009>
- Kim, H., Franks, B., & Higgins, E. T. (2013).** Evidence that self-regulatory mode affects retirement savings. *Journal of Aging & Social Policy*, *25*(3), 248–263. <https://doi.org/10.1080/08959420.2013.791788>
- Kim, H., Shin, S., Heath, C. J., Zhang, Q., & Higgins, E. T. (2017).** Regulatory mode and willingness to increase retirement savings contributions. *Journal of Applied Social Psychology*, *47*(8), 436–445. <https://doi.org/10.1111/jasp.12450>
- Komissarouk, S., Chernikova, M., Kruglanski, A. W., & Higgins, E. T. (2019).** Who is most likely to wear rose-colored glasses? How regulatory mode moderates self-flattery. *Personality and Social Psychology Bulletin*, *45*(3), 327–341. <https://doi.org/10.1177/0146167218783194>
- Kruglanski, A. W., Pierro, A., & Higgins, E. T. (2007).** Regulatory mode and preferred leadership styles: How fit increases job satisfactions. *Basic and Applied Social Psychology*, *29*(2), 137–149. <https://doi.org/10.1080/01973530701331700>
- Kruglanski, A. W., Pierro, A., & Higgins, E. T. (2015).** Experience of time by people on the go. *Personality and Social Psychology Review*, *20*(2), 100–117. <https://doi.org/10.1177/1088868315581120>
- Kruglanski, A. W., Pierro, A., Higgins, E. T., & Capozza, D. (2007).** “On the move” or “staying put”: Locomotion, need for closure, and reactions to organizational change. *Journal of Applied Social Psychology*, *37*(6), 1305–1340. <https://doi.org/10.1111/j.1559-1816.2007.00214.x>
- Kruglanski, A. W., Pierro, A., Mannetti, L., & Higgins, E. T. (2013).** The distinct psychologies of “looking” and “leaping”: Assessment and locomotion as the springs of action. *Social and Personality Psychology Compass*, *7*(2), 79–92. <https://doi.org/10.1111/spc3.12015>
- Kruglanski, A. W., Thompson, E. P., Higgins, E. T., Atash, M. N., Pierro, A., Shah, J. Y., & Spiegel, S. (2000).** To “do the right thing” or to “just do it”: Locomotion and assessment as distinct self-regulatory imperatives. *Journal of Personality and Social Psychology*, *79*(5), 793–815. <https://doi.org/10.1037/0022-3514.79.5.793>
- Kühn, S., Haggard, P., & Brass, M. (2014).** Differences between endogenous and exogenous emotion inhibition in the human brain. *Brain Structure & Function*, *219*(3), 1129–1138. <https://doi.org/10.1007/s00429-013-0556-0>
- Kumashiro, M., Rusbult, C. E., Finkenauer, C., & Stocker, S. L. (2007).** To think or to do: The impact of assessment and locomotion orientation on the Michelangelo phenomenon. *Journal of Social and Personal Relationships*, *24*(4), 591–611. <https://doi.org/10.1177/0265407507079261>
- Liu, L., Feng, T., Chen, J., & Li, H. (2013).** The value of emotion: How does episodic prospection modulate delay discounting? *PLoS ONE*, *8*(11): e81717. <https://doi.org/10.1371/journal.pone.0081717>
- Lucidi, F., Pica, G., Mallia, L., Castrucci, E., Manganeli, S., Bélanger, J. J., & Pierro, A. (2016).** Running away from stress: How regulatory modes prospectively affect athletes’ stress through passion. *Scandinavian Journal of Medicine and Science in Sports*, *26*(6), 703–711. <https://doi.org/10.1111/sms.12496>
- MacDonald, A. W., Cohen, J. D., Stenger, V. A., Carter, C. S. (2000).** Dissociating the role of the dorsolateral prefrontal and anterior cingulate cortex in cognitive control. *Science*, *288*(5472), 1835–1838. <https://doi.org/10.1126/science.288.5472.1835>
- Mathmann, F., Chylinski, M., de Ruyter, K., & Higgins, E. T. (2017a).** When plentiful platforms pay off: Assessment orientation moderates the effect of assortment size on choice Engagement and Product Valuation. *Journal of Retailing*, *93*(2), 212–227. <https://doi.org/10.1016/j.jretai.2017.02.001>
- Mathmann, F., Higgins, E. T., Chylinski, M., & de Ruyter, K. (2017b).** When size matters: sensitivity to missed opportunity size increases with stronger assessment. *Personality and Social Psychology Bulletin*, *43*(10), 1427–1439. <https://doi.org/10.1177/0146167217717244>
- Mauro, R., Pierro, A., Mannetti, L., Higgins, E. T., & Kruglanski, A. W. (2009).** The perfect mix: Regulatory complementarity and the speed-accuracy balance in group performance. *Psychological Science*, *20*(6), 681–685. <https://doi.org/10.1111/j.1467-9280.2009.02363.x>
- McClure, S. M., Laibson, D. I., Loewenstein, G., & Cohen, J. D. (2004).** Separate neural systems value immediate and delayed monetary rewards. *Science*, *306*(5695), 503–507. <https://doi.org/10.1126/science.1100907>
- McCrae, R. R., & Costa, P. T. (1987).** Validation of the five-factor model of personality across instruments and observers. *Journal of Personality and Social Psychology*, *52*(1), 81–90. <https://doi.org/10.1037/0022-3514.52.1.81>
- Mischel, W. (1973).** Toward a cognitive social learning reconceptualization of personality. *Psychological Review*, *80*(4), 252–283. <https://doi.org/10.1037/h0035002>
- Morf, C. C., & Rhodewalt, F. (2001).** Unraveling the paradoxes of narcissism: A dynamic self-regulatory processing model. *Psychological Inquiry*, *12*(4), 177–196. https://doi.org/10.1207/s15327965pli1204_1
- Orehek, E., Mauro, R., Kruglanski, A. W., & Van der Bles, A. M. (2012).** Prioritizing association strength versus value: The influence of self-regulatory modes on means evaluation in single goal and multigoal contexts. *Journal of Personality and Social Psychology*, *102*(1), 22–31. <https://doi.org/10.1037/a0025881>
- Panno, A., Lauriola, M., & Pierro, A. (2015).** Regulatory mode and risk-taking: The mediating role of anticipated regret. *PLoS ONE*, *10*(11). <https://doi.org/10.1371/journal.pone.0143147>
- Panno, A., Pierro, A., & Lauriola, M. (2014).** Self-regulation predicts risk-taking through people’s time horizon. *International Journal of Psychology*, *49*(3), 211–215. <https://doi.org/10.1002/ijop.12026>
- Pierro, A., Chernikova, M., Lo Destro, C., Higgins, E. T., & Kruglanski, A. W. (2018).** Assessment and locomotion conjunction: How looking complements leaping...but not always. *Advances in Experimental Social Psychology*, *58*, 243–299. <https://doi.org/10.1016/bs.aesp.2018.02.001>
- Pierro, A., Giacomantonio, M., Pica, G., Kruglanski, A. W., & Higgins, E. T. (2011).** On the psychology of time in action: Regulatory mode orientations and procrastination. *Journal of Personality and Social Psychology*, *101*(6), 1317–1331.

<https://doi.org/10.1037/a0025943>

- Pierro, A., Kruglanski, A. W., & Higgins, E. T. (2006).** Regulatory mode and the joys of doing: Effects of 'locomotion' and 'assessment' on intrinsic and extrinsic task-motivation. *European Journal of Personality, 20*(5), 355–375. <https://doi.org/10.1002/per.600>
- Pierro, A., Leder, S., Mannetti, L., Higgins, E. T., Kruglanski, A. W., & Aiello, A. (2008).** Regulatory mode effects on counterfactual thinking and regret. *Journal of Experimental Social Psychology, 44*(2), 321–329. <https://doi.org/10.1016/j.jesp.2007.06.002>
- Pierro, A., Pica, G., Giannini, A. M., Higgins, E. T., & Kruglanski, A. W. (2018).** "Letting myself go forward past wrongs": How regulatory modes affect self-forgiveness. *PLoS ONE, 13*(3). <https://doi.org/10.1371/journal.pone.0193357>
- Pierro, A., Pica, G., Klein, K., Kruglanski, A. W., Higgins, E. T. (2013).** Looking back or moving on: How regulatory modes affect nostalgia. *Motivation and Emotion, 37*(4), 653–660. <https://doi.org/10.1007/s11031-013-9350-9>
- Pierro, A., Pica, G., Mauro, R., Kruglanski, A. W., & Higgins, E. T. (2012a).** How regulatory modes work together: Locomotion-assessment complementarity in work performance. *TPM - Testing, Psychometrics, Methodology in Applied Psychology, 19*(4), 247–262. Retrieved from https://www.researchgate.net/publication/251880663_How_Regulatory_Modes_Work_Together_Locomotion-Assessment_Complementarity_in_Work_Performance
- Pierro, A., Presaghi, F., Higgins, E. T., Klein, K. M., & Kruglanski, A. W. (2012b).** Frogs and ponds: A multilevel analysis of the regulatory mode complementarity hypothesis. *Personality and Social Psychology Bulletin, 38*(2), 269–279. <https://doi.org/10.1177/0146167211424418>
- Posner, M. I., & DiGirolamo, G. J. (1998).** Executive attention: Conflict, target detection, and cognitive control. In R. Parasuraman (Ed.), *The attentive brain* (p. 401–423). The MIT Press.
- Race, E., Keane, M. M., & Verfaellie, M. (2013).** Losing sight of the future: Impaired semantic prospection following medial temporal lobe lesions. *Hippocampus, 23*(4), 268–277. <https://doi.org/10.1002/hipo.22084>
- Rivis, A., Sheeran, P., & Armitage, C. J. (2010).** Explaining adolescents' cigarette smoking: A comparison of four modes of action control and test of the role of self-regulatory mode. *Psychology & Health, 25*(8), 893–909. <https://doi.org/10.1080/08870440902850310>
- Schacter, D. L., Addis, D. R., & Buckner, R. L. (2007).** Remembering the past to imagine the future: The prospective brain. *Nature Reviews Neuroscience, 8*(9), 657–661. <https://doi.org/10.1038/nrn2213>
- Scholer, A. A., Higgins, E. T. (2012).** Commitment to change from locomotion motivation during deliberation. *Motivation and Emotion, 36*, 114–129. <https://doi.org/10.1007/s11031-011-9239-4>
- Vallerand, R. J. (2012).** The role of passion in sustainable psychological well-being. *Psychology of Well-Being: Theory, Research and Practice, 2*(1), 1–21. <https://doi.org/10.1186/2211-1522-2-1>
- Vallerand, R. J., Blanchard, C., Mageau, G. A., Koestner, R., Ratelle, C., Léonard, M., ... Marsolais, J. (2003).** Les passions de l'âme: On obsessive and harmonious passion. *Journal of Personality and Social Psychology, 85*(4), 756–767. <https://doi.org/10.1037/0022-3514.85.4.756>
- Vazeou-Nieuwenhuis, A., Orehek, E., & Scheier, M. F. (2017).** The meaning of action: Do self-regulatory processes contribute to a purposeful life? *Personality and Individual Differences, 116*, 115–122. <https://doi.org/10.1016/j.paid.2017.04.040>
- Volman, I., Roelofs, K., Koch, S., Verhagen, L., & Toni, I. (2011).** Anterior prefrontal cortex inhibition impairs control over social emotional actions. *Current Biology, 21*(20), 1766–1770. <https://doi.org/10.1016/j.cub.2011.08.050>
- Webb, C. E., Coleman, P. T., Rossignac-Milon, M., Tomasulo, S. J., & Higgins, E. T. (2017).** Moving on or digging deeper: Regulatory mode and interpersonal conflict resolution. *Journal of Personality and Social Psychology, 112*(4), 621–641. <https://doi.org/10.1037/pspp0000131>
- Weissman, D. H. (2005).** Dorsal anterior cingulate cortex resolves conflict from distracting stimuli by boosting attention toward relevant events. *Cerebral Cortex, 15*(2), 229–237. <https://doi.org/10.1093/cercor/bhh125>
- Wink, P., & Gough, H. (1990).** New narcissism scales for the California Psychological inventory and MMPI. *Journal of Personality Assessment, 54*(3), 446–462. <https://doi.org/10.1080/00223891.1990.9674010>
- Zhang, C., Ni, Y., & Feng, T. (2017).** The effect of regulatory mode on procrastination: Bi-stable parahippocampus connectivity with dorsal anterior cingulate and anterior prefrontal cortex. *Behavioural Brain Research, 329*, 51–57. <https://doi.org/10.1016/j.bbr.2017.04.019>
- Zhang, S., Shi, R., Yun, L., Li, X., Wang, Y., He, H., & Miao, D. (2015).** Self-regulation and study-related health outcomes: A structural equation model of regulatory mode orientations, academic burnout and engagement among university students. *Social Indicators Research, 123*(2), 585–599. <https://doi.org/10.1007/s11205-014-0742-3>
- Zhang, W., Wang, X., & Feng, T. (2016).** Identifying the neural substrates of procrastination: A resting-state fMRI Study. *Scientific Reports, 6*(1). <https://doi.org/10.1038/srep3>