

# The Role of Motivation in Cognitive Remediation for People with Schizophrenia

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**Abstract** Motivation impairment is an often prominent component of schizophrenia symptomatology that impacts treatment engagement and reduces the functional benefit from psychosocial interventions. Intrinsic motivation in particular has been shown to be impaired in schizophrenia. Nowhere is the role of intrinsic motivation impairment more evident than in cognitive remediation for schizophrenia. This chapter describes the theoretical determinants of motivation to learn and illustrates how those determinants have been translated into therapeutic techniques that enhance intrinsic motivation in a clinical context. We review the extant research that indicates how motivation enhancing techniques yield treatment-related improvements within cognitive remediation therapy and, more broadly, in other behavioral skills-based interventions for schizophrenia.

**Keywords** Cognitive remediation · Intrinsic motivation · Self-determination theory · Expectancy-value theory

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## 1 Introduction

The earliest conceptualizations of schizophrenia included motivation deficits as a key feature of the disorder (Bleuler 1911; Krapelin 1919). Symptoms such as amotivation and apathy are considered core negative symptom features that are distinctly associated with substantial functional impairment (Strauss et al. 2013) when measured cross-sectionally (Foussias et al. 2009; Gard et al. 2009) as well as longitudinally (Foussias et al. 2011). Recently, there has been an increase in focus on understanding motivational impairment—the component processes, underlying neurocognitive mechanisms, observable behaviors, and functional consequences—so as to better target this major source of disability in people with schizophrenia (Barch 2008; Fervaha et al. 2013; Medalia and Saperstein 2011).

To better understand the “why” of motivated or unmotivated behavior in schizophrenia, researchers have examined goal-directed behavior in reference to intrinsic versus extrinsic rewards. *Intrinsic motivation* describes actions and behaviors that are accomplished in the absence of an external consequence—behaviors performed because they provide inherent, intrinsic satisfaction. *Extrinsic motivation*, in contrast, describes actions and behaviors that are a means to some end, to either achieve some external gain, or to avoid a prospective loss or punishment (Ryan and Deci 2000a). In most environments, both intrinsic and extrinsic motivation are operative. For example, motivation to work may be driven by the opportunity for financial gain (extrinsic reward), but being employed may also support a sense of fulfillment and enhance self-esteem (intrinsic reward). In this chapter, we will consider the roles of intrinsic and extrinsic motivation in the treatment of people with schizophrenia.

Recovery-oriented therapeutic programs for people with schizophrenia center around skills training, so that individuals can learn the social, cognitive, employment, and educational skills necessary to navigate daily challenges and progress toward meaningful goals. Cognitive remediation is one evidence-based skills-training intervention that focuses on improving those deficient cognitive skills that impede daily functioning and goal attainment. It is a learning activity through which people learn how to better pay attention, to process information quickly, to remember better, and to problem-solve through a combination of cognitive exercise and the learning of strategies for carrying out cognitive tasks in everyday life. In this therapeutic context, cognitive and motivational processes interact to either enhance or detract from the development of cognitive skills. There is a wealth of

research that has delineated the relative contributions of intrinsic and extrinsic motivation in facilitating learning in healthy people, and an accumulating literature on the role of motivation in cognitive learning in people with schizophrenia.

## 2 The Role of Motivation in Learning

Research conducted in educational settings with non-psychiatric samples provides an empirically based and informative framework for understanding how intrinsic and extrinsic motivation influence learning as it may occur in skills-based interventions, such as cognitive remediation, employed with people with schizophrenia. On the whole, intrinsic motivation is appreciated as a central force in learning. Research indicates that when intrinsic motivation for learning is high, there is greater engagement in learning activities, greater creativity, learning, and greater persistence of learning over time (Vansteenkiste et al. 2004). Extrinsic motivators play some role in learning, although evidence indicates that when intrinsic motivation effectively drives learning behaviors in the absence of extensive external rewards, those learning behaviors are likely to be maintained. There is some research to suggest that when extrinsic rewards are offered, or contingencies are introduced, when intrinsic motivation is already strong, there is a negative impact on the amount of learning that takes place, in part by undermining intrinsic motivation (Deci et al. 1999; Dweck 1986).

Consistent with the core symptomatology of the disorder, people with schizophrenia tend to exhibit low intrinsic motivation, whether it is assessed in reference to daily activities, interest and curiosity, or goal-directed behavior in everyday life (Nakagami et al. 2008). Empirical studies of motivation in schizophrenia also indicate low intrinsic motivation in reference to treatment-related task performance and skill learning (Choi et al. 2010b). Findings of low motivation for skill learning have serious implications for the effectiveness of psychosocial skills interventions. The impact of baseline intrinsic motivation on treatment-related learning was examined in a study, which reported dramatic differences in effect sizes for learning outcomes when people with schizophrenia participating in a cognitive remediation program were divided into those exhibiting high versus low intrinsic motivation for treatment. In this study, participants were attending a community-based psychosocial program where attendance is not mandated, but is dependent upon each individual's own volition. Given the lack of external contingencies for participation, the frequency of voluntary attendance in cognitive remediation was the measure of intrinsic motivation. A large effect size was found for improvement on an untrained vocational task requiring processing speed for those who demonstrated greater baseline intrinsic motivation. By contrast, the participants who were not intrinsically motivated achieved a very small effect size on this outcome measure (Choi and Medalia 2005). These data suggest that when people with schizophrenia are intrinsically motivated for treatment, treatment engagement and outcomes may be enhanced. Knowing that people with schizophrenia tend to have intrinsic motivation

deficits, it is important to understand whether intrinsic motivation in schizophrenia is inherently stable or dynamic. If the latter, the next step is to discern the person-related or environmental variables associated with shifts in intrinsic motivation.

Recent research with schizophrenia patients suggests that intrinsic motivation can indeed change over time. In a prospective study, Nakagami et al. (2010) examined intrinsic motivation among 130 individuals with schizophrenia or schizoaffective disorder attending community-based psychosocial rehabilitation programs. Clinician ratings of intrinsic motivation (i.e., ratings of sense of purpose, motivation, and curiosity) indicated a significant change over 6 and 12 months following the initial assessment. Importantly, positive changes in intrinsic motivation were strongly associated with positive changes in psychosocial functioning, thereby underscoring the significance of intrinsic motivation in the context of treatment (Nakagami et al. 2010).

In a separate study of 57 outpatients with schizophrenia, Choi and Medalia used the intrinsic motivation inventory for schizophrenia research (IMI-SR) before and after a 4-week cognitive training intervention. Again, results supported the dynamic nature of intrinsic motivation; intrinsic motivation to participate in the training program increased in a subgroup that received a motivationally engaging version of the intervention relative to the subgroup who did not receive motivational enhancements in the training program (Choi and Medalia 2010; for a description of interventions see below). Taken together, these results indicate that intrinsic motivation is dynamic and, even when impaired, it is still sensitive to manipulation in a therapeutic context. The next section will discuss theories of motivation that have aided our understanding of how to treat motivation deficits in schizophrenia.

### 3 Determinants of Intrinsic Motivation

Two theories of motivation have figured prominently in schizophrenia research—self-determination theory (SDT) and expectancy-value theory (EVT) by providing a basis for the empirical study of therapeutic techniques that increase motivated behavior and learning outcomes.

SDT posits that behavior is driven by the need to gratify psychological needs for autonomy, competency, and relatedness (Deci and Ryan 1985). The extent to which these basic needs are met will impact motivation to learn and thus learning behavior. First, the need for *autonomy* is supported when an individual experiences an internal perceived locus of control or causality. When an individual feels, their behavior is self-determined, as opposed to being controlled by external factors, when there are opportunities for choice and self-direction, intrinsic motivation may be enhanced (Deci and Ryan 1985). Second, the need for *competency* is supported when the learning environment promotes feelings of mastery, where a sense of confidence in achieving success is supported (Ryan and Deci 2000b). SDT postulates an interactive role of autonomy and competency; for intrinsic motivation to be optimally supported, feelings of competence must be accompanied by the

attribution of success to one's own self-determined behavior. Third, the need for *relatedness* is the need to have meaningful connections with others. When a sense of security in the learning environment is supported, intrinsic motivation and learning outcomes will be supported too (Ryan and Deci 2000b).

EVT (Eccles and Wigfield 2002; Wigfield and Eccles 2002) posits that expectations for success as a learner and the perceived value of the task are interacting variables that drive motivation to learn. Expectations for success are influenced by one's assessment of past performance, ability beliefs, and one's appraisal of current task properties such as perceived task difficulty, the clarity of the task goals, and the temporal proximity of goal attainment. Similar to what is posited in SDT, an expectation to succeed yields a sense of competency and thus weighs heavily on one's drive to pursue a learning goal. In the learning context, those who feel competent are more likely to choose challenging learning tasks and will be more willing to try new ones (Schunk and Zimmerman 2008). Subjective value appraisals also impact the initiation and maintenance of learning behavior. There is nuance to the way a learning activity is valued, with respect to how interesting and enjoyable the task is, how useful it is for meeting goals, and whether attainment of the task goals is held with importance and esteem. These positive appraisals of task value are offset by perceived costs such as time, effort, stress, financial burden, or lost opportunity for other pursuits. Research indicates that the expectancy-value model predicts many learning outcomes. Expectancy for success predicts effort, engagement, and achievement in a learning context. Value appraisals predict behavioral choices to initiate a learning activity and to persist (Schunk et al. 2014). Thus when the value of engaging in a learning task is salient to the individual, and the individual expects to be successful as a learner, behavior that is oriented toward learning will occur.

## 4 Intrinsic Motivation to Learn in Schizophrenia

The theoretical perspectives on intrinsic motivation yield three basic questions that can guide research on motivation to learn in patients with schizophrenia. From the patient's point of view, these questions are as follows: "Do I expect success if I engage in the learning task?" "Do I value the task?" "Are my needs for autonomy, competence, and relatedness met when I engage in this learning activity?" Each question will be addressed in turn, using theories of motivation and empirical studies to describe intrinsic motivation to learn in schizophrenia.

### 4.1 *Do I Expect Success?*

Expectation of success is related to one's perceived ability, past performance, as well as present task difficulty (Schunk et al. 2014). In the setting of cognitive remediation, people with schizophrenia often have varied histories of successes and

struggles in school or work, and therefore come to cognitive remediation with different expectations. Frequently, as the illness progresses, success in learning activities declines and leads to expectations of further failure. There is considerable data demonstrating the impact of perceived competency on learning in non-psychiatric research samples (Jones 2009). In schizophrenia samples, data indicate that perceived competency plays an instrumental role in determining intrinsic motivation for current task performance (Choi et al. 2012) and accumulating data indicating a large role for perceived competency in learning outcomes.

Choi and Medalia (2010) examined the degree to which perceptions of competency for a difficult cognitive task contributed to the amount of learning in 57 adults with schizophrenia-spectrum disorders. Higher perceived competency on an arithmetic task prior to training predicted greater learning. These findings were corroborated in a follow-up study using an independent sample of 70 schizophrenia outpatients which reported that greater expectation of success—the perception of competence on a learning task—was the most important factor in explaining how much was learned during the training intervention and how much was retained at 3-month follow-up (Choi et al. 2010a).

Expectations of success and competency also play a significant role in translating the skills one has learned into behavior. This is illustrated in a randomized controlled trial in which 97 adults with schizophrenia were enrolled in one of two psychosocial skills-training interventions for improving functioning. The study focused on assessing daily functioning, functional capacity, and self-efficacy for performing everyday functional tasks. Data showed that only when self-efficacy was high, functional capacity was significantly associated with actual real-world daily functioning. These data suggest that without confidence in their ability to perform the skills they have learned, individuals who otherwise have the capacity to do so will maintain relatively high levels of disability (Cardenas et al. 2013). Therefore, when behavioral interventions target those skills deficits that impede functioning, motivational processes such as self-efficacy need to be targeted as well, so as to support the translation of skill capacity to skill performance in everyday life.

## ***4.2 Do I Value the Task?***

The second question “do I value the task?” is important because people are more likely to engage in a learning activity if the value is perceived. Choi et al. (2010a) demonstrated that task value is an important factor in supporting intrinsic motivation and learning in schizophrenia. In fact, individuals who ascribed greater value to the learning task also reported greater expectations for success for the learning program, thereby illustrating how value and competency beliefs may interact to impact motivation and learning. Several factors contribute to why learning experiences, such as cognitive remediation, may be valued. First, *intrinsic value* is ascribed to a task if it is interesting or enjoyable. The potential intrinsic value of cognitive exercises is important to consider when implementing cognitive remediation for

people with schizophrenia. Second, a learning activity may be perceived as having *utility value* if it is seen as instrumental in meeting one of the individual's long- or short-range goals. In cognitive remediation, the utility value of cognitive learning tasks may be enhanced by making explicit links between cognitive improvement and meaningful goals, like returning to school, work, or living independently. Third, a learning activity may have *attainment value* if it facilitates achievement of a desired self-image. For example, personal importance ascribed to remembering names, faces and details may promote motivation for engaging in memory exercises during cognitive remediation. Finally, the *cost* of engaging in the learning activity impacts the value appraisal. If cost is too high in terms of time, stress, or finances, then the value is diminished.

### ***4.3 Are My Needs for Autonomy, Competence, and Relatedness Met When I Engage in This Learning Activity?***

According to SDT, individuals will be intrinsically motivated to engage in learning tasks if they believe they have choice in the matter (autonomy), if they feel able to master the goals of the task (competence), and experience the accompanying social interactions as positive (relatedness) (Ryan and Deci 2000b). There is ample evidence to support this from studies conducted with students in educational settings (Jones 2009). Several studies with schizophrenia samples in learning settings suggest that a qualitatively similar motivational process is operative. Autonomy, as measured by perceived control, contributes to overall levels of intrinsic motivation in schizophrenia (Choi et al. 2010b) and when enhanced is associated with greater learning outcomes (Choi and Medalia 2010; Tas et al. 2012). Perceived competency was found to mediate the relationship between trait approach motivation and in-the-moment, state intrinsic motivation for learning in schizophrenia (Choi et al. 2012). Nakagami et al. (2010) and Silverstein (2010) describe the importance of creating therapeutic contexts where there is a collaborative-supportive, as opposed to controlling-hierarchical relationship between the therapist and client with schizophrenia. This is because controlling contexts, which rely on extrinsic incentives, pressure, or punishment to influence learning behavior and use directive or judgmental language in the process of learning, reduce self-determination and instead result in passivity, decreased persistence in learning, and poor learning overall (Grolnick and Ryan 1987; Vansteenkiste et al. 2004). Conversely, learning contexts where supportive language is used during instruction, and learning is personalized, foster intrinsic motivation and elicit positive learning behaviors and outcomes (Vansteenkiste et al. 2004). Taken together, studies of intrinsic motivation support the premise of SDT that gratification of needs for autonomy, competence, and relatedness are pertinent to learning outcomes in people with schizophrenia. Additionally, the factors postulated by SDT to impact intrinsic

motivation for learning appear to overlap or interact with those put forth by EVT, thus providing a comprehensive framework for translating motivation theory to cognitive remediation practice.

## **5 Translating Motivation Theory to Cognitive Remediation Practice**

We have reviewed the data that indicate that when intrinsic motivation in a learning context is high or is enhanced, so too are learning outcomes. Providing a context in which intrinsic motivation for cognitive learning is enhanced requires the translation of theoretical principles, grounded in research, to clinical practice. In an educational setting, the variables that impact intrinsic motivation to learn are manifested in the interpersonal context and in the instructional techniques employed. In cognitive remediation, basic psychological needs can be supported through the structure of the learning environment and the therapist-client relationship.

### ***5.1 The Learning Environment***

Within the learning environment, a cognitive remediation therapist can support autonomy by encouraging personal goal setting, and by guiding clients through the use of learning activities that suit their interests, learning needs and goals so that the enjoyment and utility value of cognitive exercise are emphasized. Acknowledging each client's unique learning needs and personal goals supports autonomy and may also fulfill the need for relatedness through generating an atmosphere of personal respect and support for each client's perspective. There is emerging empirical evidence that intrinsic motivation to learn is enhanced in an autonomy-supportive cognitive remediation environment where people with schizophrenia are allowed to exercise some control over their learning experience, where the value of the activity is salient and when opportunities for demonstrating competency exist (Choi and Medalia 2010).

Cognitive remediation is often conducted in a group setting, given that it is not only an efficient form of service delivery, but more so because of the positive impact of social learning on cognitive performance. Bandura's social cognitive theory (2006) posits that modeling can instill self-efficacy when, for example, a peer demonstrates effective skill learning. Thus, even if cognitive remediation clients are working individually on cognitive exercises, sharing in the learning experience with others supports a positive and supportive learning environment (Bandura 2006). In addition, when cognitive remediation group members share common goals of learning, the social supports can help to fulfill the need for relatedness and can thus boost intrinsic motivation for participating in the learning process. Some cognitive



remediation programs include a verbal discussion component, where individuals have the opportunity to relate cognitive skill learning to everyday life, and to provide feedback and support to other group members. By providing a supportive environment in which skill learning is reinforced, the experiential context of cognitive remediation can bolster intrinsic motivation for learning and facilitate the successful application of skills and strategies for recovery goal attainment.

## 5.2 *Instructional Techniques*

Instructional techniques are another social contextual determinant of intrinsic motivation to learn. Instructional variables such as personalization, choice, and contextualization (Cordova and Lepper 1996) can be embedded into specific learning activities. *Personalization* refers to the tailoring of a learning activity to coincide with topics of interest or utility value, given the individuals goals for recovery. Some computer-based learning programs personalize the learning experience by allowing the learner to enter into the program as an identifiable and independent agent, for example, by signing in by name or taking on a role within a learning task that simulates a real-world activity. *Choice* in cognitive remediation means that clients can participate in planning the course of learning activities, based on their interests, cognitive needs and learning style, and to exercise choice within cognitive exercises with regard to the difficulty level or incidental features of the program. Finally, *contextualization* means that rather than presenting material in the abstract, where the relevance for everyday life is less salient, it is put into a meaningful context, whereby the practical application to activities of daily life or personal goals is made more apparent. Some cognitive programs, for example, utilize real-world scenarios such as a coffee shop or restaurant to engage learners in exercises to improve attention and memory. By designing cognitive exercises as games, where practicing memory and attention are presented in the context of a restaurant simulation, the interest, enjoyment, and utility value of the learning task may help to drive continued learning behavior.

Empirical data support the use of these techniques in people with schizophrenia. A previously described randomized controlled trial conducted by Choi and Medalia (2010) directly compared the impact of instructional techniques on motivation and learning in people with schizophrenia. Participants were either exposed to an enhanced learning program that contextualized the cognitive task into a meaningful game-like context, created a personalized character for each participant, and provided opportunities for choice within the learning activity, or were exposed to a contrasting program that provided generic instruction. Following the course of intervention, those who were assigned to the motivationally enhanced learning program demonstrated greater intrinsic motivation for the learning experience, acquired more cognitive skill, and reported greater feelings of competency after treatment. These findings underscore the malleability of the motivational system in people with schizophrenia and provide further credence to the applicability of

motivation theory to the practice of cognitive remediation for schizophrenia, and likely for other patient populations as well.

Instructional techniques in cognitive remediation can also harness the impact of enhancing self-efficacy. As discussed above, perceived competency is a predictor of learning achievement, and level of task difficulty is a predictor of perceived competency. Instructors can carefully titrate the complexity level of cognitive exercises so that an 80 % or greater success rate is achieved, thus promoting perceived competency while also maintaining a level of challenge that supports cognitive growth. Another instructional technique that may enhance perceived competency to learn during cognitive remediation is the careful titration of the goal properties of the learning task. Tasks which have distal goals may be perceived as too difficult, or the end-goal may be perceived as too vague, thereby lessening a sense of competency for successful task completion. In contrast, tasks that have proximal goals that are clearly defined may be viewed as more attainable. Selection of learning activities should therefore consider both task complexity and goal properties, so as to best account for individuals' cognitive capacity and ability to persist, and thereby promote self-efficacy and motivation to initiate and complete a learning task.

A third instructional technique to promote self-efficacy and motivation is through provision of feedback during learning activities. *Attributional feedback*, provided by the therapist, verbalizes the link between the individual's effort or ability and their success on the task, thereby promoting a sense of agency as well as self-efficacy during the process of learning. *Performance feedback* provides information about progress in learning. Some software programs depict level of cognitive performance and improvements after each learning trial. Cognitive remediation clients can also track their own performance to encourage self-awareness of learning progress. Research suggests that people with schizophrenia who utilize feedback to self-monitor progress in learning have been shown to reap greater benefit in cognitive remediation (Wykes et al. 2007; Choi and Kurtz 2009).

A fourth instructional technique to promote expectation of learning competence is to emphasize that cognition is malleable, because of the human capacity for neuroplasticity. This contrasts with a perception of cognition as a fixed entity, which Dweck (1999) found to negatively impact learning outcomes in educational settings. Vinogradov et al. (2012) reported that schizophrenia participants who believe that intelligence is malleable show better cognitive outcomes after computerized training than those who believe it is a fixed entity, even after controlling for baseline cognition and number of hours of training. For people with schizophrenia who may have experienced repeated failures across multiple domains of functioning, emphasizing the process of learning and malleability of cognition, rather than the outcome, may best support feelings of competency. This will support active engagement in, rather than avoidance of, the learning environment and create the potential for learning to occur.

The Neuropsychological Educational Approach to Remediation (NEAR; Medalia et al. 2009) is a holistic approach to cognitive remediation for schizophrenia that incorporates theoretical principles and practices from educational psychology, learning theory, rehabilitation psychology, and neuropsychology. To optimize

learning, motivation enhancing principles are incorporated into the NEAR model in a variety of ways.

First, the NEAR approach begins with an assessment of baseline cognitive abilities, which provides an understanding of the individual's cognitive strengths and weaknesses, and an understanding of how cognitive deficits interfere with functioning. A joint client–therapist process of goal setting builds an atmosphere of respect for the individual's learning needs and a mutual understanding of the client's personal goals for recovery. Second, intrinsic motivation and task engagement are promoted through incorporating learning activities that contextualize cognitive exercise in real-world situations, through providing opportunities for personal control of the non-essential aspects of the learning environment, using multisensory presentation of cognitive learning tasks, and through personalization of learning material. These features allow for the interest, enjoyment, and utility value of cognitive tasks to be salient. Furthermore, task difficulty and goal properties of tasks are tailored to suit the needs of each individual so that opportunities for success are maximized. As clients improve, task difficulty is carefully modulated within and between different exercises, to keep rates of successful performance high while continuing to challenge and teach new skills to promote learning.

Third, the overall structure of NEAR sessions is designed to enhance intrinsic motivation. Learning occurs in a group setting to support social learning, yet there is an individualized treatment plan for each client. Treatment plans are tailored to the individual's cognitive and learning needs so that clients will readily appreciate the relevance of the tasks for their particular situation. Further, linking the cognitive remediation program to each person's overall rehabilitation goals such as work, socialization, or independent living clarifies the relevance and utility of participation in the program. Fourth, the therapist is responsible for creating an autonomy-supportive learning environment. Provision of choice of learning activities provides opportunities for self-direction and fosters autonomy. The therapist avoids use of controlling language and provides frequent positive reinforcement for adaptive learning behavior such as persistence, effective strategy use, and effort allocation. In addition, the therapist helps clients track their learning progress on cognitive exercises which promotes self-reflection on cognitive progress and demonstrates competency.

To date, the NEAR approach has been successfully implemented in outpatient and inpatient settings which serve diverse psychiatric populations (Medalia et al. 2000, 2001, 2009; Hodge et al. 2010). This is but one of many holistic approaches to treating cognitive impairment in psychiatric disorders, and treatment techniques that systematically address motivation impairment to improve treatment engagement and outcomes are increasingly being studied in a broader range of interventions for schizophrenia (Grant et al. 2012; Silverstein 2010). Given ongoing investigations of the cognitive and neural mechanisms associated with motivational impairments in schizophrenia (see Waltz and Gold in this volume), therapeutic strategies may continue to evolve. We have illustrated that taking into account the social contextual variables that impact intrinsic motivation can create the optimal therapeutic conditions in which effective skill learning and functional goal attainment can be achieved.

## 6 Conclusion

Motivation is a key determinant of psychosocial treatment outcome and is thus an important target for behavioral intervention. When it comes to learning, motivation theories posit the central role of intrinsic motivation. Research indicates that the motivational factors that affect cognitive skills learning in people with schizophrenia are similar to those in non-psychiatric populations. Motivation theory and research have thus served as useful guideposts for the development of strategies to target low levels of intrinsic motivation during learning to augment treatment outcomes.

Although intrinsic motivation may be lowered in schizophrenia, importantly for therapeutic opportunity, it is malleable. Specific environmental conditions are able to support the expression, maintenance, and enhancement of this motivational capacity. When learning environments are able to gratify psychological needs of autonomy, competence, and relatedness, and foster expectations of success and the value of learning, intrinsic motivation is supported.

Empirical studies have demonstrated that in people with schizophrenia, there is a natural variability in the extent to which learning tasks are perceived as having interest, enjoyment, and utility value. There is also variability in the extent to which people with schizophrenia feel competent when engaging in learning tasks. We have described data from schizophrenia samples that show that these experiences, conceptualized as underlying intrinsic motivation, not only predict volitional learning behavior in the absence of extrinsic rewards, but also account for the magnitude and sustainability of learning. Importantly, data show that when instructional techniques support intrinsic motivation to learn, there are indeed measurable changes in intrinsic motivation, accompanied by greater participation in learning activities, and greater learning outcomes. It is important to note that the enhanced learning outcomes evidenced by pre- and post-treatment assessment in these studies were not due to baseline level of ability or the intensity with which learning sessions occurred. Rather, the data indicate that by providing the supportive conditions, intrinsic motivation for learning is indeed enhanced, and learning outcomes are improved.

We have also shown that perceived competency during learning is a powerful determinant of learning in and of itself. Perceived competency appears to be an important link between motivational drive measured more broadly and intrinsic motivation within a specific learning context. Data also suggest that perceived competency is an important mechanism through which motivational enhancements in cognitive remediation result in significant changes in cognitive ability. In accordance with motivation theory, people with schizophrenia must believe that their actions can lead to positive outcomes or else they may have little incentive to take on challenging treatment tasks. This has been demonstrated not only in the context of cognitive remediation, but also in the context of utilizing learned psychosocial skills to carry out daily life tasks important for real-world functioning.

How do the social and contextual determinants of intrinsic motivation translate into treatment-related improvements? To date, the data suggest that when people

with schizophrenia value learning, experience successes, and attribute their success to their self-directed effort, subsequent engagement in the learning activities is deepened, effort on learning activities persists, and learning outcomes are enhanced. While these data have demonstrably influenced the design of cognitive remediation interventions, there are clear implications for the integration of these principles to support engagement in any psychosocial skills-training intervention for people with schizophrenia and other psychiatric disorders. A motivationally supportive therapeutic context may not only enhance learning within the psychosocial treatment milieu, but also set the stage for the deployment of learned skills in real-world contexts, thereby promoting recovery goal attainment and functional improvement.

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