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Authors

Le, Thanh
Green, Michael
Wynn, Jonathan
et al.

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Effort-based decision-making as a determinant of supported employment outcomes in psychotic disorders

Thanh P. Le[a,b,c,*], **Michael F. Green**[b,c], **Jonathan K. Wynn**[c,b], **Julio E. Iglesias**[c], **Richard L. Franco**[b], **Alex Kopelowicz**[b], **Robert S. Kern**[b,c]

[a]Semel Institute for Neuroscience and Human Behavior, University of California, Los Angeles, Los Angeles, CA, United States of America

[b]Department of Psychiatry and Biobehavioral Sciences, David Geffen School of Medicine, University of California, Los Angeles, Los Angeles, CA, United States of America

[c]Veterans Affairs Greater Los Angeles Healthcare System, Los Angeles, CA, United States of America

Abstract

Schizophrenia is associated with a heavy economic burden in the United States that is partly due to the high rates of chronic unemployment. Individual Placement and Support (IPS) is an evidenced-based type of supported employment that can improve job obtainment and work outcomes in psychotic disorders. Outcomes vary widely and a persistent challenge for IPS is low levels of engagement in the initial job search phase. Past studies have focused on interview-based motivation deficits as a key determinant of poor treatment engagement and work outcomes in schizophrenia. New validated performance-based measures of motivation, including effort-based decision-making (EBDM) tasks, may explain supported employment outcomes and provide insights into individual differences in IPS outcomes. This study investigated the degree to which IPS engagement (i.e., number of sessions attended during the first four months of service delivery) was related to baseline interview-based motivation deficits and performance on three EBDM tasks – two tasks of physical effort and one of cognitive effort (i.e., Balloon Task, Effort Expenditure for Rewards Task, Deck Choice Effort Task) – in a sample (N = 47) of people with a psychotic disorder. Results indicated that the level of EBDM performance, specifically on the Balloon Task, predicted IPS engagement, accounting for an additional 17 % of the variance above and

*Corresponding author at: University of California, Los Angeles, Department of Psychiatry and Biobehavioral Sciences and the Semel Institute for Neuroscience and Human Behavior, 300 UCLA Medical Plaza, Room 2240, Los Angeles, CA 90095, United States of America. thanhle@mednet.ucla.edu (T.P. Le).

CRediT authorship contribution statement

TPL: conceptualization, formal analysis, writing - original draft, writing - review, and editing, MFG: conceptualization, supervision, resources, writing - review and editing, JKW: assistance with data interpretation, writing - review and editing, JEI: project administration, RLF: project administration, AK: project administration, RSK: funding acquisition, study design and conceptualization, investigation, project administration, data curation, writing - review and editing.

Declaration of competing interest

RSK is a consultant for MATRICS Assessment, Inc., a non-profit organization formed after the selection of the final MATRICS Consensus Cognitive Battery (MCCB) to allow its distribution and receives financial compensation for his efforts in this role. The rest of the authors report no biomedical financial interests or potential conflicts of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.schres.2023.11.003.

beyond interview-based motivation deficits (total R^2 = 24 %). Overall, these findings suggest that addressing motivational deficits in effort-based decision-making may be beneficial to IPS engagement, which in turn may improve the trajectory of work outcomes.

Keywords

Individual Placement and Support; Effort valuation; Motivation; Employment; Work; Schizophrenia

1. Introduction

Schizophrenia is a major contributor to disability and is associated with an economic burden of more than $343.2 billion annually in direct and indirect costs in the United States (Kadakia et al., 2022). A significant portion of this cost is due to the high rates of chronic unemployment among individuals with schizophrenia. Unemployment also has adverse effects on the general population's mental and physical health, including increased levels of depression, stress, and unhealthy behaviors such as smoking, overeating, and a sedentary lifestyle, which can lead to health problems such as heart disease (De Hert et al., 2011; Paul and Moser, 2009). In individuals with schizophrenia, the consequences of unemployment are pronounced and include increased severity of psychiatric symptoms, increased risk of suicide, higher rates of homelessness, and perpetuation of the stigma that mental illness is a debilitating condition that prevents participation in meaningful life activities (Bond et al., 2001; Mueser et al., 1997). Therefore, it is crucial to understand the determinants of unemployment to address this public health concern effectively. This study investigates the link between motivation and differences in employment outcomes, specifically engagement in supported employment services, among individuals with psychotic disorders.

Prolonged periods of unemployment are common for many individuals with schizophrenia and other psychotic disorders with unemployment rates peaking at 80–90 % (Lin et al., 2022). Supported employment is an evidence-based practice designed to help individuals with schizophrenia obtain and maintain competitive employment (Dixon et al., 2010). A leading type of supported employment is the Individual Placement and Support (IPS) model, which emphasizes integration with mental health treatment services and continuous individualized support (Drake et al., 2012). IPS recipients are 2–3 times more likely to get a job than those receiving traditional vocational rehabilitation (Bond et al., 2008), although outcomes vary widely. IPS places a strong emphasis on rapid job search activities, conducted with the guidance of an employment specialist, within weeks following enrollment into the program. This period is recognized as the most pivotal phase for achieving subsequent employment success. However, 20 to 60 % of IPS recipients do not obtain competitive work, and mean job tenure ranges from 10 weeks to over one year (Heslin et al., 2011; Hoffmann et al., 2014; Twamley et al., 2012; Waghorn et al., 2014). A key challenge for IPS is low levels of engagement, including poor attendance, in the initial job search phase (Drake et al., 2012). Furthermore, employment specialists estimate that 20–30 % of their clients fail to stay actively involved in IPS, despite expressing an interest in working. As observed in

other studies (Dixon et al., 2016; Kukla et al., 2015; Le et al., 2022), this reduced vocational rehabilitation engagement is likely related to motivational deficits in schizophrenia.

Motivational deficits are typically assessed with clinical ratings of negative symptoms in schizophrenia, and they have been linked to poor role functioning and employment outcomes. For instance, in previous work from our group, we investigated the impact of negative symptoms on job obtainment and work outcomes in individuals with schizophrenia and observed modest associations between motivation and pleasure deficits (but not expressive deficits) and job obtainment, hours worked, and wages earned (Llerena et al., 2018). Further, we found that self-reported intrinsic motivation related to feeling valued and useful in a work role significantly predicted employment outcomes in individuals with schizophrenia who were enrolled in a supported employment program (Reddy et al., 2016). These studies, and work from other labs (Kukla et al., 2015; Mahmood et al., 2019), highlight the importance of motivational factors on job obtainment and work outcomes in schizophrenia.

Beyond clinical ratings of motivation in schizophrenia, there are now validated performance-based measures of motivation, including effort-based decision-making (EBDM) tasks. These types of tasks involve a cost-benefit analysis, such as weighing the potential benefits (e.g., rewards) of performing a task versus the costs of the task (e.g., task difficulty; Kring and Barch, 2014). EBDM paradigms are adapted from preclinical models of motivation and reward processing and operationalize motivation as the amount of effort an animal is willing to exert for different levels of reward (Young and Markou, 2015). Compared to controls, individuals with schizophrenia are less willing to exert effort for monetary rewards, especially when reward values are high (Culbreth et al., 2018; Green et al., 2015; Strauss et al., 2016). In schizophrenia, performance on these tasks sometimes (Barch et al., 2014; Chang et al., 2020; Cooper et al., 2019; Gold et al., 2013), though not always (Cathomas et al., 2021; Docx et al., 2015; Fervaha et al., 2013; Gold et al., 2015), correlates with negative symptoms and community functioning. While interview-based motivation deficits are a crucial factor in determining work outcomes, they do not explain most of the variance and include several drawbacks that can complicate assessments, including recall and introspection difficulties, vulnerabilities to biases, and an unwillingness to disclose (Cohen et al., 2019; Horan et al., 2015; Le et al., 2017). Performance-based measures of motivation are a potentially critical factor, and recently adapted EBDM paradigms may provide new insights into why some individuals receiving IPS services experience suboptimal outcomes and differ in their level of engagement with the program. Aberrant EBDM may explain why some individuals receiving IPS services are insufficiently engaged and experience subsequent poor work outcomes. Patients may perceive the physical and cognitive cost of active participation in IPS as outweighing the potential advantages of securing employment. Such paradigms may also enhance the ability to develop targeted treatments in this area.

With increasing calls for individually tailored interventions (Drake et al., 2022; Lenze et al., 2020; Velligan et al., 2008), it is critical to identify modifiable variables that can be targeted to enhance engagement in empirically based, vocational rehabilitation such as IPS. The current study used fine-grained measurements of motivation based on EBDM to provide

new insights into the determinants of IPS engagement. To our knowledge, this type of translational approach has not been previously applied to understand the heterogeneity in supported employment outcomes. We investigated the degree to which IPS engagement (i.e., number of sessions attended) was related to baseline interview-based motivation and expression deficits and performance on three EBDM tasks – two tasks of physical effort and one task of cognitive effort (i.e., Effort Expenditure for Rewards Task, Balloon Task, Deck Choice Effort Task) – in a stabilized sample of people with psychotic disorders. We used both physical and cognitive EBDM tasks for two reasons. First, this approach allows us to have a more comprehensive assessment and there are very few comparisons of multiple types of effort paradigms within the same study. Second, most of the existing literature on schizophrenia and serious mental illnesses has predominantly focused on examining the relationship between performance on physical EBDM tasks and outcome measures. We expected to find a significant positive relationship between the level of EBDM performance and the degree of engagement over the initial four months of IPS services. We also expected that the level of EBDM performance would explain unique variance in engagement above and beyond interview-based motivation deficits.

2. Methods

2.1. Participants

The total sample included 47 veterans drawn from IPS programs at the VA Greater Los Angeles Healthcare System and the San Fernando Mental Health Center. All participants met SCID-based DSM-5 criteria for schizophrenia, schizoaffective disorder, or other psychotic disorder. Inclusion criteria were: minimum of 21 years of age, clinically stable (i.e., no psychiatric hospitalizations in the past three months, same antipsychotic medication for past two months), had no evidence of current or past neurological disorder (e.g., epilepsy), had no history of head trauma with loss of consciousness exceeding 1 h, had no moderate or severe substance use disorder in the past three months per DSM-5, and sufficient ability to understand spoken and written English. Antipsychotic medication type and dose were maintained by the participants' treating psychiatrist. Diagnostic interviews and symptom ratings were carried out by clinical interviewers trained to UCLA certification standards (i.e., kappa >0.80 with a gold standard rater) and to standards established by the Treatment Unit of the Department of Veterans Affairs VISN 22 Mental Illness Research, Education, and Clinical Center (Ventura et al., 1993, 1998). The protocol received approval from the Institutional Review Boards at both UCLA and VA Greater Los Angeles Healthcare System. To ensure that participants provided informed consent, they were assessed for their capacity before proving written consent. Participants received financial compensation for their participation.

2.2. Measures

2.2.1. Interview-based motivation and expression—CAINS is the Clinical Assessment Interview for Negative Symptoms (CAINS; Kring et al., 2013). The CAINS is semi-structured and consists of 2 subscales. The Motivation and Pleasure (MAP) subscale includes 9 items based on patients' reports of experienced motivation, interest, and emotional experiences, as well as reported engagement in relevant social (e.g., family,

romantic, and friend relationships), vocational (e.g., work, school, and volunteer), and recreational (e.g., hobbies, free time) activities, over the past week. The Expression (EXP) subscale includes 4 items based on interviewer ratings of affective and verbal expression. Each item is rated by an interviewer on a scale ranging from 0 to 4 with higher scores reflecting greater impairment during the previous week. Both the MAP and EXP subscales scores were used in analyses.

2.2.2. Effort-based decision-making tasks—Detailed descriptions of each EBDM task, along with relevant modifications for individuals with psychotic disorders, are provided in prior publications (Reddy et al., 2015) and are briefly summarized here.

The Effort Expenditure for Rewards Task (EEfRT; Barch et al., 2014; Treadway et al., 2009) involves participants selecting between easy or hard button-pressing tasks for variable amounts of reward. The “hard” task required participants to make a specific number of button presses using their non-dominant pinkie finger on a computer keyboard within 30 s, which was calibrated individually for each participant. In contrast, the “easy” task required only one-third of the button presses to be made using their dominant index finger within 7 s. The task consisted of 50 trials, and the entire administration process took approximately 25 min. The easy task was always worth $1.00, and the hard task ranged in reward value from $1.24 to $4.30. The rewards for the hard task were grouped into low, medium, and high bins for analysis, and the key measure was the percentage of choices for the hard task comparing the low versus high level of reward. While probability manipulation was used in this adapted task, including 50 % and 88 % probability levels, we did not consider it as a factor in the current set of analyses.

The Balloon Effort Task (Gold et al., 2013), which is similar to the EEfRT, requires alternating button presses on a gamepad using the left and right index fingers to pop a computer image of a balloon. Participants were told that they would make decisions between 2 response alternatives: an easy option (trials that involved ten button presses) with a lower reward and a more difficult option (hard trials that involved 100 button presses) with a higher reward. There was no set time limit for completing the task. Participants underwent a total of 40 trials, with eight trials per reward level. On average, the task was completed in approximately 25 min. Participants were informed that three trials would be randomly selected from each task to determine their earnings, and the amount would be made known to the participant at the end of each task and paid at the end of the assessment. The easy trials were worth $1, and the hard trials ranged in value from $3 to $7. We calculated the percentage of hard choices at each of the reward levels.

The Deck Choice Effort Task (Kool et al., 2010; McGuire and Botvinick, 2010) is a cognitive effort task that requires participants to choose between easy or hard conditions of a mental operation task across three levels of rewards by selecting one of two decks of cards. The color of the card within a deck indicates the mental operation to be performed. For the “easy” deck, the cards are all the same color and thus require only a single mental operation to be performed such as determining whether a number is odd or even. For the “hard” deck, the cards alternate between two colors, thus requiring alternating mental operations, e.g., blue card = deciding whether a number is odd/even; red card = deciding whether a number

is > or <5. Hard and easy trials were explicitly labeled as well. Participants practiced until they reached 70 % accuracy on the easy and hard tasks before choosing each of the 36 trials. The easy deck always earns a $0.10 reward, while the hard deck includes an equal number of trials worth $0.10, $0.20, and $0.40. Each trial consisted of ten cards, and the task took approximately 20 min to complete. We calculated the percentage of hard choices at each reward level.

For the EEfRT ($5) and Balloon Effort Task ($7), all participants received the same amount of financial reward at the end of the tasks period regardless of performance. For the Deck Choice Effort Task, compensation was tied to performance and participants received between $3 and $7.

2.2.3. Engagement in IPS services—All participants were newly enrolled in supported employment services provided under the IPS model. IPS is an evidence-based model that emphasizes rapid job search, integration within a multidisciplinary treatment team, attention to the individual's job preferences, and continuous follow-along support. IPS engagement was defined behaviorally as the number of in-person sessions attended with participants' supported employment specialists over the first four months after enrollment. We followed newly enrolled IPS participants for four months from program entry to measure engagement, which is similar to a definition used in a recent IPS study (Haslett et al., 2014). Per the IPS model, job search efforts with the assistance of the employment specialist begin within several weeks after enrollment. As seen in Table 1, participants averaged around 5 sessions with their IPS employment specialist (range: 1 to 12 sessions).

2.3. Procedures

The assessments, including clinical symptoms (Brief Psychiatric Rating Scale; Ventura et al., 1993), negative symptoms, neurocognition (MATRICS Consensus Cognitive Battery; Nuechterlein and Green, 2006), and EBDM tasks, were conducted at baseline before the patients started IPS.

The primary measure for each task is a difference score which provides an index of the amount of effort exerted across varying reward levels: the number of hard choices out of the total possible at the highest reward level minus the number of hard choices out of the total possible at the lowest reward level [(no. hard / no. possible hard at highest reward level) – (no. hard / no. possible hard at lowest reward level)]. Higher scores indicate a greater willingness to exert effort for large vs. small rewards. These EBDM paradigms, adapted for use with psychotic disorders, were previously evaluated and shown to be reliable with good construct validity (Horan et al., 2015; Reddy et al., 2015). Specifically, the difference score showed acceptable test-retest reliability, negligible practice effects, and consistent external validity with measures of neurocognition, negative symptoms, and functioning. We counter-balanced the order of administration of the EBDM tasks. See Fig. S1 in supplementary materials for the distribution of data for the three EBDM tasks.

Of note, difference scores can be problematic due to inflexible responders who consistently choose either 100 % hard or 100 % easy tasks across all reward levels on each of the effort paradigms. In such cases, assigning both types of inflexible responders a value of "0"

could be misleading since they represent subtypes of participants with different willingness to exert effort for rewards. To avoid this issue, we excluded participants who consistently selected hard tasks across all reward levels, thus eliminating subjects from the analysis who had no room to demonstrate increases in effort allocation with increased reward. The removal of these inflexible responders resulted in sample sizes of 38 for the Deck Choice Task, 38 for the Balloon Task, and 47 for the Effort Expenditure for Rewards Task. See supplementary materials for a table (Table S1) that summarizes the level of IPS sessions attended for inflexible responders who chose always hard, inflexible responders who chose always easy, and flexible responders.

2.4. Statistical analysis

Analyses were conducted in three steps. First, descriptive statistics were computed for each of the variables. Second, Pearson correlational analyses were to determine the degree to which IPS engagement (i.e., number of sessions attended) was related to baseline interview-based motivation and expression and performance on the three EBDM tasks. Third, follow-up hierarchical regressions were conducted to examine the amount of variance in IPS engagement that was explained by interview-based motivation and expression deficits (step 1), and then by motivation deficits along with any significant EBDM task variable from the previous correlational analyses (step 2). All tests were two-tailed, and all variables were normally distributed (skew <1.0, kurtosis <1.5).

3. Results

Table 1 presents the demographic, cognitive, and clinical characteristics of the sample. This outpatient sample was chronically ill and, on average, had moderate levels of symptoms. Mean MCCB scores are typical for this type of sample. Demographic characteristics (e.g., age, gender, race, ethnicity, education) and neurocognition were generally unrelated to IPS engagement.

Associations between IPS engagement and interview-based motivation and expression deficits are shown in Table 2. The relationship between CAINS MAP and IPS engagement approached significance, while CAINS EXP was linked with IPS engagement. Performance on the Balloon Effort Task (i.e., greater willingness to exert effort for large vs. small rewards) was significantly associated with a higher number of sessions attended. Performances on the Deck Choice Effort Task and EEfRT were not linked with IPS engagement. Also, CAINS MAP scores were not associated with the three EBDM tasks.

Follow-up regression analyses are shown in Table 3. In Step 1, 16 % of the variance was explained by the CAINS MAP and EXP scores. CAINS MAP was not a statistically significant predictor of IPS engagement. The relationship between CAINS EXP and IPS engagement approached significance. The overall model also approached significance (F = 3.22, p = .06). In Step 2, performance on the Balloon Effort Task was added to the model because it was significantly linked with IPS engagement in the correlational analyses. An additional 10 % of the variance was explained (total R^2 = 26 %) and the overall model for Step 2 was significant (F = 3.83, p = .02). Of the three variables in Step 2, only the Balloon Effort Task was significantly linked with IPS engagement.

4. Discussion

This study examined interview-based motivation and performance-based measures of motivation (i.e., EBDM tasks) as determinants of engagement in IPS among a sample of individuals with psychotic disorders. The relationship between interview-based motivation and IPS engagement approached significance. This finding is inconsistent with prior studies that have shown interview-based motivation deficits as significant clinical correlates of work outcomes (e.g., job tenure, hours worked, wages) in psychotic disorders (McGurk et al., 2003; McGurk and Meltzer, 2000; Saperstein et al., 2011). Interestingly, interview-based expressive deficits were linked with fewer attended IPS sessions. Our primary finding was that the level of EBDM performance, specifically on the Balloon Effort Task, explained unique variance in IPS engagement above and beyond interview-based motivation deficits, accounting for an additional 10 % of the variance beyond interview-based motivation deficits (total R^2 = 26 %). Overall, these findings help explain some of the unaccounted-for variance in supported employment outcomes, provide insight into potential neural mechanisms underlying suboptimal IPS engagement, and indicate modifiable personal variables that can improve outcomes in supported employment programs.

The Balloon Effort Task was the only EBDM task significantly associated with IPS engagement. It may be that effort-based measures of motivation that require physical (versus cognitive) effort are more closely associated with demands of attending the IPS sessions (i.e., physically leaving residence and going to the clinic). The EEfRT also involved physical effort, but the Balloon Effort Task might be experienced as more demanding than the EEfRT. Indeed, the overall mean difference score for the EEfRT task (0.32) was higher compared to the Balloon Effort Task (0.25), suggesting that patients were more willing to exert effort for large vs. small rewards in the EEfRT task compared to the Balloon Effort Task. Alternatively, differences in perceived certainty of receiving a reward on the EEfRT (i.e., probability manipulation) and Deck Choice Task (i.e., compensation tied to performance) may explain why the Balloon Effort Task was the only EDBM task linked with IPS engagement. Finally, it is worth noting that EBDM tasks, like the Balloon Effort Task, incorporate several distinct processes that may have contributed to poor IPS engagement. For example, a patient may have deficits in evaluating the subjective value of the potential reward (i.e., monetary rewards from work), predicting the likelihood of receiving the reward (i.e., obtaining a job), estimating the subjective effort cost (i.e., commuting to a clinic and participating in job interviews), and processing the perceived costs and benefits in decision making (Green et al., 2015). Any of these specific processes or combinations thereof may contribute to poor IPS engagement.

Abnormal effort-based decision-making may explain why some individuals receiving IPS services experience suboptimal engagement and subsequently poor work outcomes. Patients may perceive the cost of meaningful engagement in IPS to be *greater* than the potential benefit of securing a job. Such costs could include arranging transportation to scheduled sessions, commuting to their respective mental health center, navigating through the traffic of Los Angeles, the effort associated with searching for employment and discussing job preferences with the mental health treatment team. Interview-based motivation may not have been specifically related to IPS engagement because clinical interviews like the CAINS

are broader in scope and measure interest and emotional experience, as well as reported engagement across multiple activities (e.g., social, vocational, and recreational activities). Interview-based expression was significantly linked to IPS engagement in correlational analyses, and trending in regression analyses. A previous study (Llerena et al., 2018) did not observe significant associations between expressive deficits and job obtainment. Additional research is needed to understand the precise relationships between expression deficits and work outcomes in patients with psychotic disorders.

Our results provide the support that performance-based measures of motivation can be used to identify patients with low motivation above and beyond measures that rely on a clinical interview of a patient's self-report. Assessment of EBDM and motivation in patients with psychotic disorders before IPS may provide insight into initial and sustained engagement and an opportunity for focused discussions intended to enhance commitment (Mueser et al., 2016). For example, motivational interviewing, which is a person-centered therapeutic approach that strengthens intrinsic motivation for positive behavior change by resolving ambivalence and promoting self-efficacy, is an effective and brief method for enhancing task-specific motivation to engage in a behavioral intervention (Choi and Medalia, 2010). MI can enhance aberrant effort-based decision-making by exploring the participant's views about his or her vocational functioning and abilities, providing information on how job obtainment and maintenance can be achieved through collaborative IPS, conducting a decisional balance activity to weigh the pros and cons of pursuing a job, and building motivation for change. In other psychosocial interventions for schizophrenia, particularly cognitive remediation, 2–3 sessions of motivational interviewing before cognitive training have also been found to increase both motivations attributed to cognitive learning and subsequent session attendance (Fiszdon et al., 2016, 2022). To our knowledge, no study has been conducted to augment IPS with systematic motivational enhancement techniques. However, recent efforts have been made to enhance the positive outcomes of IPS by supplementing it with social skills training (Christensen et al., 2015), cognitive remediation (McGurk et al., 2015), and digital tools that enhance direct service and streamlined workflow in the IPS process (Lord et al., 2014).

The study has several limitations. First, our sample size was modest, which limited the statistical power and generalizability of the findings. Relatedly, the Balloon Effort Task and Deck Choice Effort Task had a relatively high proportion of inflexible responders, which could have also impacted power and led to a bias in the sample. Second, we focused only on one supported employment outcome, namely the number of IPS sessions attended. Assessing the role of EBDM as a determinant of other important work outcomes, such as successful job obtainment, job tenure (measured by the number of weeks and hours worked), and wages earned, will require additional longitudinal assessments (i.e., beyond the four months used in this study). These potential analyses may reveal connections between performance on the EEfRT with work outcomes as Horan et al. (2015) previously observed links between EEfRT performance and the work functioning subscale of the Role Functioning Scale. Third, we were unable to assess the role of IPS program fidelity. Program variables may be as important in predicting supported employment outcomes as individual motivation levels (Becker et al., 2001). Fourth, the range of IPS sessions attended was low. However, this attendance level reflects engagement in community-based, service

delivery settings with real-world challenges, conditions, and behaviors, thus enhancing the study's ecological validity. Fifth, the study's focus was on motivation as a determinant of IPS engagement. Hence, we did not assess other possible personal factors or practical logistical challenges that could influence employment in schizophrenia separate from a patient's level of motivation. These factors could include internalized/externalized stigma, self-esteem, social support, transportation arrangement and costs, economic disincentives, or incarceration history (Evensen et al., 2017; Marwaha and Johnson, 2004; Rössler et al., 2019).

The findings of this study suggest that evaluating and addressing motivational deficits may be beneficial to IPS engagement, which in turn affects obtaining competitive employment and improving the trajectory of work outcomes. Specifically, individuals with aberrant EBDM may benefit from structured motivational enhancement interventions early in IPS delivery or other supported employment interventions to improve engagement, job obtainment, and job maintenance over time. These findings highlight the importance of motivation deficits to understanding the heterogeneity in work outcomes observed in IPS and supported employment services more broadly.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

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Table 1

Descriptive and demographic data (N = 47).

Variable	M (SD) or %
Demographics	
Age	44.2 (14.9)
Gender (% identified male)	84 %
Race	
White	46 %
Black	36 %
Asian	12 %
Other	6 %
Ethnicity - Hispanic	44 %
Education	12.8 (1.3)
Schizophrenia diagnosis	58 %
Illness chronicity (years)	18.1 (12.9)
MCCB composite score	38.1 (7.8)
Antipsychotic medication	
Atypical	78 %
BPRS symptoms	
Positive symptoms	7.3 (2.9)
CAINS negative symptoms	
Motivation and pleasure	19.4 (8.0)
Expression	6.7 (5.4)
IPS attendance	5.0 (2.8)

Note. MCCB = MATRICS Consensus Cognitive Battery; BPRS = Brief Psychiatric Rating Scale; CAINS = Clinical Assessment Interview for Negative Symptoms; IPS = Individual Placement and Support.

Table 2

Correlations between motivation measures, expression, and IPS engagement (n = 38–47).

	CAINS MAP	CAINS EXP	Effort Expenditure for Rewards Task	Balloon Effort Task	Deck Choice Effort Task	IPS sessions
CAINS MAP	–	0.70**	0.01	−0.15	−0.06	−0.26 t
CAINS EXP		–	−0.02	−0.39*	0.03	−0.34*
Effort Expenditure for Rewards Task[a]			–	0.34*	0.56**	0.03
Balloon Effort Task[a]				–	0.49**	0.38*
Deck Choice Effort Task[a]					–	0.02
IPS sessions						–

Note. Individual Placement and Support; CAINS = Clinical Assessment Interview for Negative Symptoms; MAP = Motivation and Pleasure; EXP = Expression. $t < 0.10$.

[a]Difference scores were used as the primary measure for each task, with higher values indicating greater willingness to exert effort for large vs. small rewards.

*$p < .05$.

**$p < .01$.

Table 3

Multiple regression for the prediction of IPS engagement by motivation measures.

	R^2	R^2 change	F	β	t
Step 1 overall model	0.16	–	3.22^{t}		
CAINS MAP				0.01	0.04
CAINS EXP				0.41	-1.91^{t}
Step 2 overall model	0.26	0.10	3.83^{*}		
CAINS MAP				−0.05	−0.24
CAINS EXP				−0.21	−0.97
Balloon Effort Task				0.36	2.10^{*}

Note. IPS = Individual and Placement Services, CAINS = Clinical Assessment Interview for Negative Symptoms, MAP = Motivation and Pleasure, EXP = Expression.

$^{t}p < .10$.

$^{*}p < .05$.