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Neuropsychological Test Feedback of a School Dropout with Depressive Episode

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Psychological test feedback provides objective guidance in decision-making as well as assists in rehabilitation and treatment. The effectiveness of feedback must be judged in terms of patient benefits. This case study aims to study the benefits of neuropsychological test feedback in an individual with a depressive episode. This study is designed as a case study of a school dropout diagnosed with a depressive episode. The neuropsychological assessment feedback session has been conducted following the Collaborative Therapeutic Neuropsychological Assessment model (CTNA). In particular, the focus of this case study is on how the Color Trails Test and the Wisconsin Card Sorting Test can be used as therapeutic interventions in a depressive episode. Results show that the neuropsychological test feedback helps the individual in decision-making, resolving conflicts, making priorities, and improving interpersonal communication. Results also show treatment effects in symptom reduction, level of functioning, and overall improvement in subjective well-being. The findings have implications for managing depressive episodes and the use of test feedback as a therapeutic intervention.

Keywords: feedback, depression, neuropsychological assessment, therapeutic assessment.

Theoretical and Research Background for Treatment

Depression is a major public health concern in terms of its prevalence, dysfunction, morbidity and economic burden. Depressive disorders are characterized by the presence of depressive mood, and loss of pleasure accompanied by cognitive, behavioral and neurovegetative symptoms that affect the individual's ability to function. The National Mental Health Survey India, 2015-2016, found the overall current prevalence of depressive disorders in India is 2.7 percent and the lifetime prevalence rate is 5.3 percent (Gururaj et al., 2016).

Cognitive symptoms of major depressive disorder are characterized by reduced concentration, memory deficits, and impaired decision-making processes. Criterion 8 of the Diagnostic and Statistical Manual of Mental Disorders (DSM-5) for a major depressive episode is concerned with diminished ability to think or concentrate, criterion 5 is concerned with psychomotor agitation or retardation, and criterion 2 states that depressive patients may have diminished interest or pleasure in all activities, and all these criteria are related to cognitive functions in depression (American Psychiatric Association, 2013).

Hot and Cold cognition in depression

Hot cognition and Cold cognition are the two important concepts to understand cognitive function in depression (Roiser & Sahakian, 2013). Hot cognition refers to cognitive processes which take into account the reciprocal interaction between emotion and cognition. Individuals with depression show more negatively biased responses on tests of emotional processing related to emotional and social stimuli like tests of perception, memory, attention, and working memory. Hot cognition is also related to reward and punishment processing. Reward learning is poor in anhedonic depressive individuals. Depressive individuals are hypersensitive to negative feedback and

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hyposensitive to positive feedback. On the other hand, Cold cognition refers to information processing without any emotional influence. Cold cognition is measured on tests where the stimuli are emotionally neutral like the Trail-Making Test, the Wisconsin Card Sorting Test, the California Verbal Learning Test, the Tower of London test, etc. Impairment in working memory tasks involving neutral emotional material in depressive patients is an example of cold cognitive impairment.

Ahern et al.,(2019) proposed a hot-cold cognitive model of depression emphasizing the complementary roles of both hot and cold cognition in depression onset and maintenance. This model postulates that cold cognitive deficits are likely to act as a gateway to facilitate the activation and expression of the hot cognitive biases through a weakened executive control like cognitive flexibility, inhibition, working memory, or a weakened ability to attend, retrieve and critically assess information. Cold cognitive deficits become hot cognition by negative mood state and diminished cognitive resources contribute to the further deficit in problem-solving and may act as a stressor for the onset of recurrent episodes and maintaining the depressive cycle. The exacerbated cold cognitive deficits act as internal stressors that trigger the repeated activation of dysfunctional hot cognitions, and it became apparent in day-to-day functioning and provides a source of self-referent feedback to confirm negative schemas about the self. Cold cognitive deficits reinforce hot cognition by providing accessible schema-congruent material and maintain the depressive cycle. This model proposes that cognitive remediation strategies such as attention training and improving control over thinking can facilitate flexibility in shifting attention and disengaging from negative schemas and biases. Cognitive training as an adjunct to cognitive behavior therapy may help to treat depression.

Neuropsychological Test Feedback

Historically, the neuropsychological test feedback was not provided to patients face to face, it was typically provided to referring sources in the form of a report. The current clinical practice demands feedback sessions with patients where the meaning given by the patient to the findings is given utmost importance and by which patients experience a sense of increased control over and involvement in therapy (Pegg et al., 2005). Feedback sessions go beyond diagnosis, it helps patients to understand their particular clinical presentation in the context of their real-world environment in an empathic and therapeutic way. Feedback can be a process of framing and reframing the narratives of patients and their significant others, by which they can make their clinical formulation, a collaborative clinical formulation. Feedback sessions can provide an atmosphere to explore the interaction between hot cognition and cold cognitions. Neuropsychological tests and feedback can provide a bridge between cognitive and emotional issues by answering salient life concerns(Gorske & Smith, 2009). Neuropsychological test feedback can be provided in multiple sessions and it can take the form of brief psychotherapy (Postal & Armstrong, 2013). An effective neuropsychological test feedback session addresses how psychological and neurological factors interact to produce the clinical presentation and understanding these interactions can guide the management of the clinical condition. This case study tries to use neuropsychological test feedback sessions as a therapeutic intervention by following the Collaborative Therapeutic Neuropsychological Assessment model (Gorske & Smith, 2009) in a depressive patient.

The Collaborative Therapeutic Neuropsychological Assessment

The model of Collaborative Therapeutic Neuropsychological Assessment (CTNA) is developed by Gorske and Smith (Gorske& Smith, 2009). It is a patient-centered method for conducting an initial neuropsychological assessment interview and feedback session. The basic components of CTNA are initial interviews, standardized neuropsychological assessment sessions, and feedback sessions. The initial interview has three main components: (a) understanding the problem, (b) understanding the patient's emotional experience of the problem, and (c) understanding the patient's wishes for the assessment, results, and outcomes. The feedback session has some basic steps like setting the agenda and introducing the feedback report, developing life implication questions, determining a personal skill profile, providing feedback from individual test results combining both strengths and weaknesses, and summarizing the relationship between test results, life areas, and patient questions.

Case Introduction

This case study represents one of the patients who participated in a study on the effectiveness of neuropsychological assessment as a therapeutic intervention in individuals with depressive episodes.

This study was approved by the Institutional Ethics Committee of Lokopriya Gopinath Bordoloi Regional Institute of Mental Health (LGBRIMH), Tezpur, Assam. The patient is an 18-year-old male school dropout diagnosed with a depressive episode who visited LGBRIMH OPD service for treatment.

Presenting Complaints

The patient presented with the chief complaints of low mood and feelings of loneliness, hopelessness, worthlessness, and helplessness for the last six months.

History

The patient lives with his father and elder sister in a rented house. His mother committed suicide when he was 4 months old. He has always been a lonely child since childhood. He went to school for 9-10 months at the age of 5 years and discontinued. He had one friend whom he is not in touch with for the last 1-2 years. The friend's family has moved home and since then the patient has had fewer social interactions. The patient feels like he has no one to talk to and he has been feeling low since their rented house has broken down. The patient's relationship with his father is not strong and the family is facing financial difficulties as the patient's father is the only earner and he has no regular income.

Assessment

The following measures were administered throughout the treatment as periodic measures at two weeks intervals starting from the first contact:

Beck Depression Inventory (BDI; Beck, 1987): 21 groups of statements are offered with the subject selecting the one that best matches his/her current state. Responses are scored 0-3 corresponding to no, mild, moderate or severe depressive symptomatology in the response. If two or more responses are of the same magnitude they are designated by letters (a, b, or c). The alpha reliability coefficients range from .76 to.95 in psychiatric samples and from .73 to .92 in non-psychiatric samples indicating good internal consistency.

Schwartz Outcome Scale (SOS-10; Blais et al., 1999): The SOS-10 is a 10-item scale designed to measure a broad domain of psychological health and well-being. Items are rated on a 6-point Likert scale, from 0 (indicating "never") to 6 (indicating "all of the time or nearly all of the time"). The SOS-10 has been shown to have strong internal consistency (Cronbach's alpha = .96) as well as convergent and divergent validity with measures of hopelessness, self-esteem, positive and negative affect, mental health, fatigue, lifesatisfaction, psychiatric symptoms, and desire to live (Blais et al., 1999).

The Functional Assessment Short Test (FAST; Rosa et al., 2007): has been developed by the Bipolar Disorder Program at the University of Barcelona, Spain, to assess functional impairment symptoms such as autonomy, occupational functioning, cognitive functioning, financial issues, interpersonal relationships, and leisure time.

The following neuropsychological tests have been used as therapeutic assessment:

The Color Trails Test(D'Elia et al., 1996): This test was developed by the WHO as part of a multicentre study on HIV infection. It has two parts. Part one requires sustained attention, perceptual tracking and simple sequencing, while part two requires mental flexibility in addition to the above. Both parts measure focused attention because the subject has to ignore irrelevant numbers while scanning the number which is next in sequence. For this study, the Color Trail Test has been taken from the NIMHANS Neuropsychology Battery.

Wisconsin Card Sorting Test (WCST; Milner, 1963): This test examines concept formation, abstract reasoning, and the ability to shift cognitive strategies in response to changing environment. The test consists of 128 cards with stimuli of various forms. The stimuli vary in terms of three attributes: color, form and number. In addition to these 128 cards, there are 4 stimulus cards.

Procedure

During the first contact, the periodic measures have been administered and the patient continued Treatment as Usual (TAU) till the 4th week of first contact and during this period the periodic measures have been administered at two weeks intervals. In the 4th week of first contact, the Collaborative Therapeutic Neuropsychological Assessment (CTNA) intervention has been introduced and continued for four weeks. After termination of CTNA intervention, follow-up sessions have been conducted at the interval of two weeks and administered the periodic measures.

Course of Treatment

The Initial Interview (session 1): During the initial interview the patient described his feeling of loneliness and low mood. He stated that he wants to express and share his feelings and thoughts with others. He has less access to interact with others and much of the

time he stays in their own house. The patient wants to tell his father that he wants to go outside and interact with others and share his thoughts and feelings, but he can't ask his father. He used to write his thoughts and feelings on his father's laptop using some Voice to Typing application and get some satisfaction. Currently, he is not able to write also and feels very low. Earlier he was able to do some creative thinking which is not possible for him to do now. He attributes these difficulties to his low mood-"if mood is OK then all are Ok, I wanted to improve my mood". He mentioned about lack of personal space in the home and difficulties to maintain privacy in the home attributed to their poor economic condition and it makes him feel low. He cannot concentrate on his thought and cannot be focused in his home environment. He is also confused about his future and not able to decide what to do, particularly when others ask him to do some work. At the same time, he also mentioned that he is positive and hopeful.

The major themes or concerns that came out during the initial session are the need to share and express, the importance of a good mood, the inability to be focused and difficulties in concentration, difficulties in decision making, the importance of a favorable home environment, and stable financial condition.

At the end of the initial session, the patient has been socialized to the process of neuropsychological assessment, particularly the Color Trails Test and WCST. It is being socialized that neuropsychological functions are the basic brain functions that are used in our daily living and every task we do. It is communicated that although neuropsychological test results are not guaranteed to answer all the concerns of the patient, the neuropsychological tests can provide some guidance and direction to many concerns of him and some concrete answers to some specific concerns.

StandardizedNeuropsychological Assessment (session 2): In this session, firstly the Color Trails Test from the NIMHANS Neuropsychology Battery has been administered by following the standardized procedure and noted down the time taken to complete the main parts of Color Trails 1 and 2 for standard scoring. Secondly, the Wisconsin Card Sorting Test from the NIMHANS Neuropsychology Battery has been administered

Setting the Agenda and Introducing the Feedback Report (session 3):Here, the patient is being introduced to the process of giving feedback and the importance of his experience of participating in the assessment process has been discussed. The collaboration of objective test findings and the meaning he gives to those findings have been discussed. How this collaboration can lead to the use of test results for his life concerns and particularly for his problems is discussed.

By asking about his experience with testing, the patient reported that he had felt the time was a barrier in performing the Color Trails Test where he had to perform as fast as possible. Particularly he felt difficult to be focused in the Color Trails Test 2 where he had to alternate between colors. He felt some difficulties in focusing on numbers and at the same time alternating the colors. He felt confused in being attentive to both the number and colors at the same time. He also relates this feeling to his real-life experience of being confused about whether to listen to his own or others. In WCST, as there is no time factor in performing the task he felt free to perform. Remembering the previous feedback helped him to decide where to keep the cards. He relates the WCST experience by asserting that minimal options help in making a decision and consistency is required to perform well in a task or life. He also states that feedback helps to understand a situation or others. By relating to WCST performance he felt that he tends to do overthinking and it makes him confused as well as creates obstacles in expressing his thoughts and emotions.

Developing Life Implication Question (session 4): In this session, by going through the patient's concerns and his personal experience of neuropsychological assessment, some life implication questions have been formed which can be potentially answered by neuropsychological test results. A total of three questions have been formed collaboratively: (a) how can I express and share myself in front of others that gives me pleasure? (b) how can I decide about my future and overcome the fear of independent decision-making? (c) how can I be more focused in my life with less confusion?

Determining a Personal Skill Profile (session5): Here, the information has been provided regarding the scoring of neuropsychological test findings and how a raw score is converted into percentile by following the norms of the NIMHANS Neuropsychological Battery. The method of norm-based scoring is explained to the patient and how the patient's cognitive functioning is described in relation to peers. To make the feedback

about personal strengths and weaknesses simple, the patient's performance has been categorized into three categories: above average (scores above the 75th percentile), average (scores between the 25th and 75th percentile), and below average(scores lower than the 25th percentile). The patient is being socialized into the rating methods.

The patient's performance on individual tests is graphically presented below:

Figure1

Graphical Presentation of Patient's Performance on the Color Trails Test

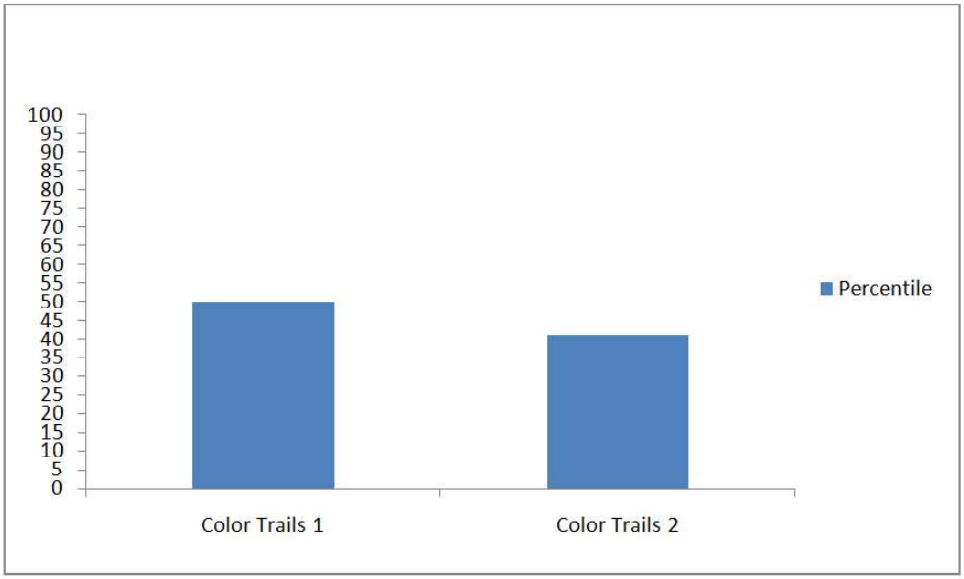
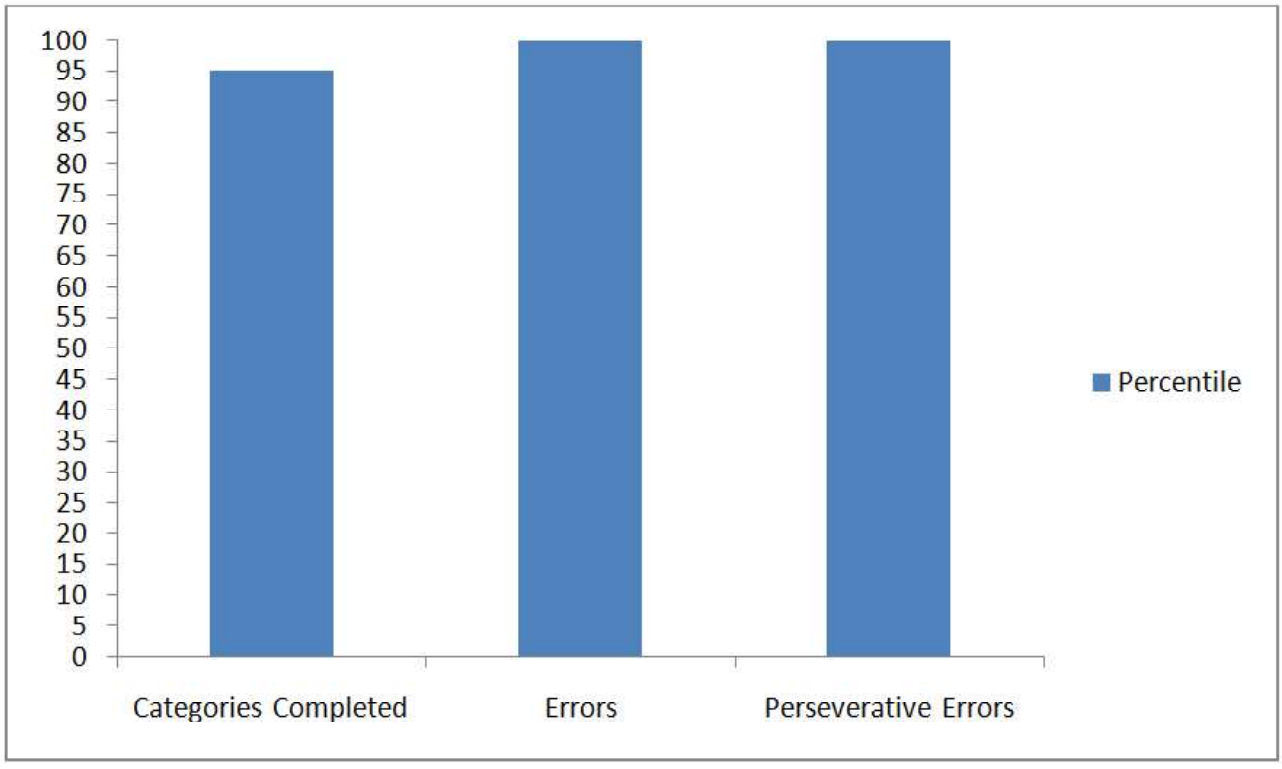


Figure 2

Graphical Presentation of Patient's Performance on the Wisconsin Card Sorting Test



Feedback about Personal Strengths and Weaknesses (session 6): Firstly, the skills assessed by the Color Trails Test and the Wisconsin Card Sorting have been described to the patient. It is communicated that WCST assesses the ability to analyze and solve problems, make the correct decision, be flexible in thinking, benefit from feedback on performance and make changes when necessary. Concerning the Color Trails Test, it is being described how this test assesses the ability to pay attention, focus and concentrate. Here, the patient referred to his personal experience of assessment shared in session 3 as a reaction to this description of skills assessed by the two neuropsychological tests.

Secondly, the above average and average level of performance in the WCST and the Color Trails Test respectively shared with the patient. The patient reacted to this information by accepting that he can be attentive and can do multi-tasking but sometimes he tends to be confused when there are many options available. He is not getting the opportunity in real life to perform his multi-tasking ability. He also mentioned that he is flexible and he can adjust to new situations, and that is how he is surviving after his mother's death in an unfavorable home environment. The patient accepted his ability to make an independent decision but in real life, he is not getting the chance or appropriate feedback to make some independent decisions. At the same time, he also mentioned that the reason behind the lacking of needed feedback in his life may be the absence of sharing and expression of his emotion and thoughts.

Thirdly, when his comparatively low performance in the Color Trails Test has been shared he reacted by referring to the time factor in performing the task as mentioned in session 3. He reacted by accepting that under pressure it is very difficult for him to concentrate and think properly.

Collaborative Case Conceptualisation: The initial interview and the process of feedback sessions showed that the patient never communicated his feelings, thoughts, and needs to his father or anyone close to him. He missed the personal space to present himself and make his choices. He felt directionless. He found his family environment too weak to address and channelise his needs. He is facing an internal conflict of various needs that are not channelized and this conflict is leading him to feel lonely and low. He is searching for a direction in life and independent living as well as a sound interpersonal relationship where he can share his thoughts and emotions.

Summarising Relationships between Tests Results, Life Areas and Patient's Questions (session 7): In this session collaboratively summarized the relationship between test results and life implication questions. The patient's first question:"how can I express and share myself in front of others that gives me pleasure?" is answered by referring to his personal experience of the tests where he felt that the tests were helping him to express his ability and performed well. He had the experience that sharing feedback helps to express and communicate with others. Implicating his life situation it is being discussed that he has to initiate communication of his needs and use the feedback process to realize the interpersonal situations.

The patient's second question (how can I decide about my future and overcome the fear of independent decision-making?) was related to independent decision-making. The independent decision-making is addressed by referring to his experience and the results of WCST. The discussion roamed around how he was making an independent decision based on feedback given during the test administration. The patient realized that both 'yes' and 'no' feedback helped him to decide about the current card to be placed. In the same line, it is being realized that there is no need to fear mistakes as it also helps us to learn and decide about things. It is necessary to have a clear plan to solve problems.

The third question (how can I be more focused in my life with less confusion?) is addressed by referring to his experience of limiting options to minimize confusion. Patient reflected on his experience in the Color Trails Test where he was stressed by the time factor and his performance was comparatively low in the Color Trails Test.

Change Plan and Recommendation (session 8): Based on the previous session's summarization some change plans have been made collaboratively. Firstly, it is decided to communicate his needs to his father and make priorities of needs to avoid conflicts. Secondly, a plan has been made to follow the steps of effective decision-making steps: identify and define the decision he wants to make, gather relevant information, identify the alternatives, weigh the evidence, choose among alternatives, take action, and review decisions and consequences. The patient reflected on these plans by recalling his experiences during assessment and

feedback sessions, particularly his experience of minimizing options and using feedback in decision-making.

FollowupSession 1: The patient came up with a decision to continue his education collectively decided by discussing it with his father. He is gathering relevant information from various sources like school teachers, well-wishers, and the internet. He has listed out some alternatives like regular schooling, open schooling, and vocational training. During the session, the patient expressed that the feedback session or the intervention has given him direction. He needed a mirror to see himself and he found this mirror in the intervention. A collaborative discussion on the pros and cons of every alternative has been done.

FollowupSession 2: The patient's decision-making process is reviewed and the patient comes up with a clear decision to continue his regular schooling. Regular schooling is preferred instead of open schooling because he needs to interact with others and share his emotions and thoughts. He will miss this opportunity in open schooling. He has taken some active steps also. He visited a nearby school and he was informed that it will be possible to continue his education. During the session, his decision is reviewed and discussed its consequences collaboratively. He seemed to be very confident in making his decision.

Assessment of Progress

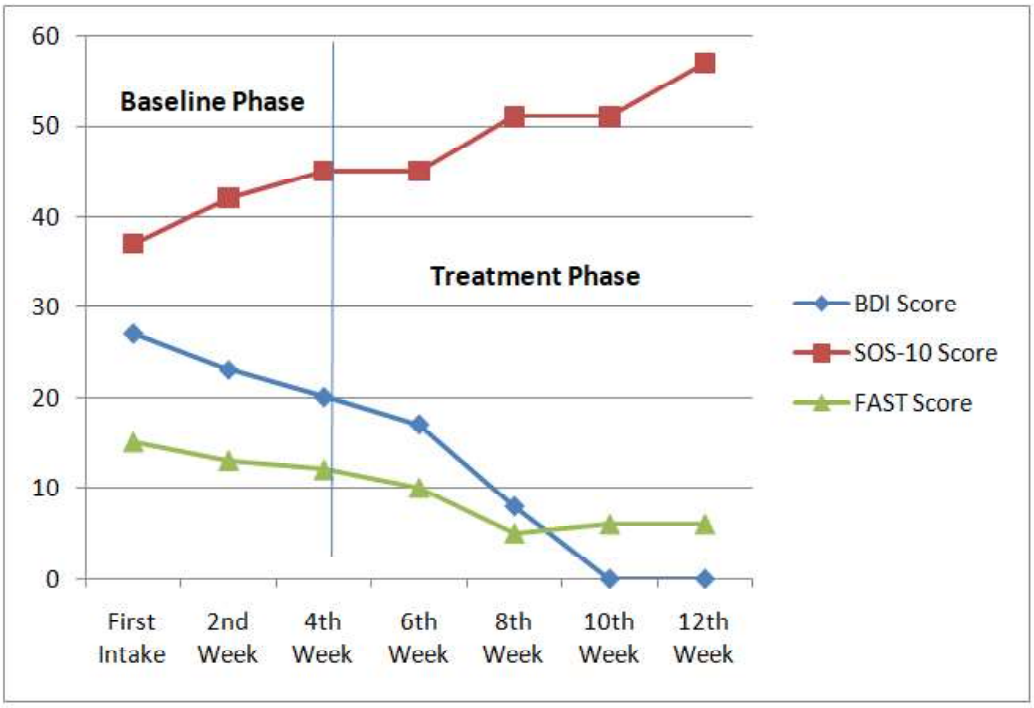
The experimental single case design with repeated measurement is used to investigate the effects of therapeutic intervention. The baseline phase is compared with the phase following the onset of the intervention (i.e the Initial Interview session). The baseline phase consists of 3-time points of periodic measures (BDI, SOS-10, FAST) at the time of the first intake, 2nd week of the first intake, and 4th week of the first intake. The treatment phase consists of 4-time points of periodic measures (BDI, SOS-10, FAST) at the time of the 6th week of the first intake (session 4), the 8th week of the first intake (session 8), the 10th week of the first intake (follow up session 1), and the 12th week of the first intake (follow up session 2).

The periodic measures data are presented in the following Figure 3 and analyzed by using the Tau-U approach which combines nonoverlap between phases with intervention phase trend and can correct for a baseline trend (Parker et al., 2011). The results of the Tau-U analysis are presented in the following Table 1.

The data from periodic measures is presented below:

Figure 3

Graphical Presentation of BDI scores, SOS-10 Scores, and FAST Scores



The Results of Tau-U analysis to investigate the treatment effect are presented in the following table

Table 1

Results of Tau-U analysis of Periodic Measures Comparing Intervention Phase with Baseline Phase

Periodic Measures	TAU Score	Z Score	P Value
Baseline BDI Scores vs Intervention BDI Scores	-1	-2.1213	0.0339
Baseline SOS-10 Scores vs Intervention SOS-10 Scores	0.9167	1.9445	0.0518
Baseline FAST Scores vs Intervention FAST Scores	-1	-2.1213	0.0339

The Tau-U results suggest that the treatment phase is associated with a significant reduction of symptoms (BDI; TAU= -1, $p=0.0339$; $p<0.05$). The graphical presentation of BDI scores in Figure 3 also suggests that there is a downward trend in BDI scores in both phases and the Tau-U analysis suggests that there is no presence of a baseline trend in the baseline scores of BDI indicating a treatment effect in symptom reduction.

The Tau-U analysis of SOS-10 scores (SOS-10; TAU=0.9167, $p=0.0518$; $p>0.05$) with an absence of baseline trend suggests that although the treatment phase is associated with higher wellbeing scores, an upward increase in the graphical presentation of SOS-10 scores in Figure 3, the effect is not significant.

The Tau-U analysis of FAST scores suggests that there is a consistent downward trend of scores in both phases and it also agrees with the graphical presentation of FAST scores in Figure 3. The Tau-U analysis rules out the presence of a significant baseline trend and suggests a significant treatment effect on the functioning level of the patient (FAST; TAU= -1, $p=0.339$; $p<0.05$).

Complicating Factors

The main complicating factors of the patient's progress were the weak relationship with the father and the implementation of the change plan particularly implementing his decision to continue regular schooling. Although the patient has taken some concrete steps to continue regular schooling, it was difficult to work on this goal because of his current age. But the patient confidently explored the decision-making and problem-solving process by counting the pros and cons and had taken the real steps to achieve his goal. The neuropsychological assessment feedback helped him to realize the process of decision-making and problem-solving. In the later stage of intervention, the patient also improved his communication with his father and included him in the process of decision-making.

The Implication of the Case

The results of the assessment of the treatment progress indicate that neuropsychological assessment as a therapeutic intervention can improve depressive symptoms, level of functioning, and associated with well-being. Neuropsychological assessment feedback can enhance self-efficacy and helps in decision-making and problem-solving. This case also signifies the role of achievement needs particularly educational achievement in improving mental health. Neuropsychological assessment feedback assists in making some real-life concrete steps that help depressive patients to reduce symptoms and enhance functioning.

Declaration of Conflicting Interests

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