



MEASURING THE EFFECTIVENESS OF CONTINGENCY MANAGEMENT INTERVENTION ON PATIENTS' TREATMENT ENGAGEMENT AND INTERNAL MOTIVATION: A RANDOMIZED CONTROLLED TRIAL

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Abstract

Purpose: The purpose of the study was to determine the effect of the implementation of Contingency Management (CM) intervention in a mandatory treatment center in Malaysia. Treatment engagement within psycho social sessions and treatment motivation were monitored in a randomized controlled trial study.

Methodology: A total of 44 patients were chosen as participants and randomly assigned into two groups namely the experimental group of treatment as usual + contingency management (TAU+CM) (n=22) and the controlled group of treatment as usual (TAU) (n=22). The TAU+CM group followed a 12-week CM intervention and 4-week maintenance period without CM reinforcement. Meanwhile, the TAU group went through 16 weeks of usual psychosocial session implemented in the center.

Measurements: The main outcome of the research was the effect of CM toward treatment engagement within treatment session and a secondary analysis to measure the patients' treatment motivation using Treatment Motivation Questionnaire (TMQ) during pre, post, maintenance phase and follow up after four months. CM reinforcement using reward stickers with monetary value were contingent with every achieved treatment engagement behavior. No reward was given to the TAU group.

Findings: CM found to be effective on treatment engagement of the patient and has a significant effect on motivation especially toward internal motivation.

Conclusion: CM proven to be effective in improving patients' treatment engagement and patients' motivation internally compared to the usual program.

Keywords: Contingency management, substance use disorders, addiction treatment and rehabilitation, effectiveness

INTRODUCTION

Substance use disorders (SUDs) is a chronic relapsing disease which proved to be very challenging especially in the aspect of treatment and rehabilitation (Ibrahim et al., 2009). In 1983, Malaysia declared drug problem as a major threat to national security. It was seen not just as a social problem but was regarded as a security issue to the country. Malaysia's National Drug Policy was developed in 1996 to reduce the supply and demand of illicit drugs in Malaysia through four main strategies which is law enforcement, prevention, education and publicity, treatment and rehabilitation and international cooperation and coordination on drugs related matters (National Anti-Drugs Agency. Dasar Dadah Negara, 2015)

SUDs have a very significant effect toward the community especially toward the social and well being of the public. Drug addiction undermine health and longevity and are economically costly. Several economic studies showed that the cost which directly and indirectly related to drug addiction varied between 0.07 to 1.7 percent of Gross Domestic Product (GDP) of the reviewed countries. Additionally, the majority of researched countries recorded a high percentage of costs related to demand and supply reduction intervention of drugs abuse (UNODC, 2016). In Malaysia, a research conducted by Universiti Utara Malaysia in 2008, showed that Malaysia has lost more than RM8.65 billion spending on drug enforcement, treatment and rehabilitation. The value also consists of loss of productivity and cost cause by crime related to drug abuse (Ali et al., 2009).

Despite all the initiative conducted by the government, SUDs continue to increase each year. Crimes related to drug abuse are being highlighted in the media all the time. Various treatment approaches, rehabilitation programs, and prevention campaigns have been actively carried out by the Malaysian government. Countless expenses and energy have been devoted to ensuring the hopes and desire in making Malaysia a drug free country. However, these efforts should be improved in line

with the changes and trends of drug use globally through the use of more scientific and evidence-based approaches.

LITERATURE REVIEW

Contingency management (CM) intervention is an evidence-based approach that are currently being considered in Malaysian setting. Previous studies conducted in the west for the past 30 years has proven CM to be effective in establishing behavior changes among drug addicts (Davis et al., 2016; Hartzler et al., 2012; Rohsenow, 2008). Drug abuse is a disease resulted from a process of learning and strengthening to a response as stated in the Operant Conditioning Theory and Classic Behavioural Theory (Carroll and Onken, 2005). The same approach should be applied in order to counter the effect of drug addiction through the use of Contingency Management (CM) intervention. CM is designed based on the principles to establish a behaviour using positive reinforcement similar to drugs reinforce substance use. CM treatment rearranges the environment to directly detect drug use and encourage patient participation in activities that promote recovery (Higgins et al., 2013; Petry, 2000). In most CM studies, reinforcement was given in the shape of vouchers that can be redeemed with daily items, facilities and special privileges in the treatment settings (Higgins et al., 2002). CM approach which focus more on positive reinforcement rather than punishment lessened the association of treatment with punishment thus improving the effectiveness of treatment and prolonging their recovery.

CM targeting substance abuser has proven to be an effective intervention. However, there are a conflicting proof of CM effectiveness in the long run. Several studies found CM can remain effective in longer term Higgins et al. (2000) meanwhile some studies found the opposite (Rawson et al., 2006; Sigmon and Higgins, 2006). Any intervention including CM depends on the internal motivation as the main reason to determine a longer lasting effect of treatment (Hartzler et al., 2012). The focus of the study was to find out whether CM can intrinsically motivate an individual towards treatment. From previous literature, CM has not been highlighted directly with enhancing intrinsic motivation. Thus, by focusing on the Self Determination Theory, this study will determine whether CM can improve and have an effect toward treatment motivation especially internal motivation of the patients.

METHODOLOGY

Research Design

The study used a randomized controlled trial design involving random assignment of participants into two groups. 44 patients were assigned randomly into two group of experimental and controlled group using excel random number generator. The patients in the experimental group received the usual treatment program with CM intervention (TAU+CM). Meanwhile, the control group received only the treatment as usual program (TAU). The TAU+CM group were exposed to the treatment for 12 weeks and continue with the treatment for another four weeks without CM reinforcement as a maintenance phase. For the TAU groups, they received the usual psychosocial program for the full 16 weeks. Weekly assessment was done to measure treatment engagement, meanwhile for the treatment motivation, assessment was done at four time point of pre, post, maintenance and four months follow up (refer to Figure 1). A semi-structured interview was also done among the patients in order to understand better the effectiveness of CM to the intrinsic motivation toward the treatment programs and to see the consistency from what have been identified in the quantitative analysis.

Participants

A total of 94 CCRC patients were invited to join the study. From the total screened, 44 patients met with the inclusion criteria and selected as participants in the study. The participants were selected based on the following criteria: entering CCRC for the first time; aged between 19 to 39 years old; participate in psychosocial programs; be able to read and write; male; Malay ethnicity; and did not have any form of psychiatric disorder or chronic disease; did not take part in any drug substitution therapy, and; agree to join the research. Every necessary requirement regarding the ethical aspects of the study had been dealt with and explained to the participants accordingly prior to the study. The Universiti Sains Islam Malaysia's ethics board committee has accepted and granted approval on the implementation of the study (USIM/JKEP/2018-35).

Treatment programs

The CCRC's treatment program consists of psychosocial session which combined components of relapse prevention, cognitive behavioral therapy, psycho-education and family intervention approaches, and also the 12-steps program. This evidence-based program has been adopted and adapted into Malaysian addiction treatment setting and have been found effective for the patients' recovery (Mohamed et al., 2009). The psychosocial session was conducted in a weekly basis with each session, patients will discuss on different recovery topic every week. Homework and assignment related to the session

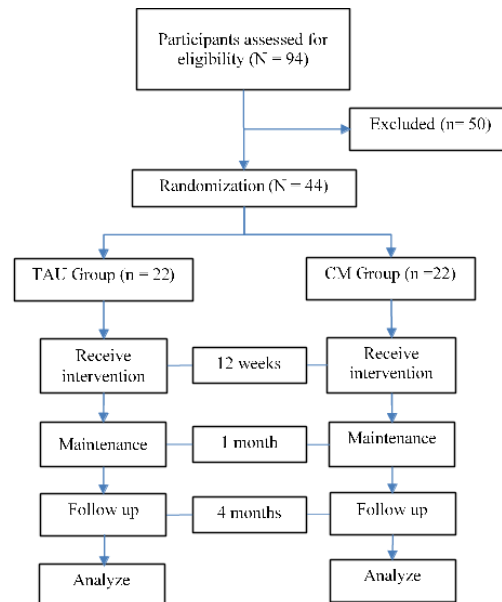


Figure 1: Randomization of participants

were given which they have to submit in the next session. For the purpose of this study 16 topics were used for discussion within the duration of the study.

Instrument

CM used reward sticker using star chart format based on Bartholomew et al. (2005) to reinforce positive behavior during treatment session (treatment engagement). Reinforcement were given based on achieved targeted goal related to treatment engagement such as completion of homework/ assignment, participate actively in the treatment session, and perform well in the weekly quizzes. For each accomplishment, a reward sticker would be given and added on the patients' chart.

To measure the patients' motivation, a standardized questionnaire namely Treatment Motivation Questionnaire (TMQ) were used (Cahill et al., 2003; Ryan et al., 1995; Zeldman et al., 2004). The TMQ consists of four sub-scales which is (a) internal and (b) external (c) help seeking and (d) confidence in treatment. The TMQ used a Likert score of (1) being 'not at all true' to (7) being 'very true'. The questionnaire was translated into Malay language using 'back to back translation' and a pilot test was conducted and found a high reliability and validity with Cronbach's alpha .83 for external, .96 for internal, .81 for help seeking, and .73 for confidence in treatment.

Study procedures

CM implementation in this study was developed based on the protocol established by (Petry, 2000). The procedures conducted in a psychosocial session every week for the period of 12 weeks and another four weeks with no CM reinforcement as a maintenance phase. Reinforcer in the form of reward stickers were given according to the treatment engagement parameters. The reward stickers have monetary value which can be exchanged for certain items which are not available and can only be obtained outside of the center such as fast food, toiletries, books and clothing items. The value of each sticker begins with MYR2.00 and increase every four weeks to the value of MYR5.00 per stickers. Each person can get a maximum of three stickers every week and can earn a maximum value of MYR15.00 every week. The patient who collected the most stickers after every four weeks get a bonus sticker equivalent to MYR10.00.

Data Analysis

G*Power tool to analysis was used and found that the total number of 44 participants selected was appropriate number of sample size for this study. The researcher have set the alpha, power, and effect size values based on (Daly and Cohen, 1977) and (Lipsey, 1990) . Intention to treat analysis (ITT) were also used to avoid the risk of non-random attrition of participants and to provide unbiased comparisons among the treatment groups. Blinding were performed on both treatment group to avoid the issue of rewards rivalry and compensation between both groups. Statistical software IBM-SPSS (version 22 for windows) was used to analyze the data. Group comparison for baseline characteristic was done using t-test, for

continuous data, χ^2 test was calculated for nominal and categorical data. Generalized estimating equation (GEE) analysis was performed to examine the individual treatment engagement performance. Meanwhile, repeated measured ANOVA (RM ANOVA) were used to measure the patients' motivation using the Treatment Motivation Questionnaire. Appropriate correction using Greenhouse-Geisser tests for results with unequal variances assumptions or inequality of variances were used in this study.

FINDINGS

Baseline Characteristics

Socio-demographic characteristic of the 44 subjects are based on the inclusion criteria determined by the researcher. A few added information was also included such as education level, marital status, and occupational information to further explore the background of the subjects. Overall, the average age of the participants are 28 years old with Malay ethnicity and Islam in religion. Around 50% (CM+TAU) to 65% (TAU) have an education level of Higher Learning Certificate (SPM). More than 60% of them are single and less than 20% of them are working and has an average income of RM1500 to RM2200 (Table 1).

Table 1: BASELINE DEMOGRAPHIC CHARACTERISTICS

Variables ^a	TAU Controlled Group (n=22)	CM+TAU Experimental Group (n=22)
Gender (% male)	100	100
Age	28.9 (4.8)	28.7 (4.6)
Ethnicity (% Malays)	95.7	100
Religion (% Islam)	100	100
Education level (%)		
Diploma	0	9.1
SPM	65.2	50.0
PMR	21.7	27.3
Primary School	13.0	13.6
Marital status (%)		
single	60.9	68.2
married	30.4	31.8
divorced	8.7	0
Occupation status (% working)	21.0	16.0
Average income	2215.7 (2014.8)	1577.3 (946.1)

^aValues are mean(SD), otherwise declared.

Clinical characteristic at baseline showed an average substance use starting at the age of 23 years old for the TAU+CM group and at 24 years old in the TAU group with a period of addiction of 4 to 5 years. Reason for drugs use was difference between both groups with 50% of TAU+CM group are caused by peer influence and 61% from the TAU group, because they wanted to try. All patients entered the CCRC for treatment for the first time and were all methamphetamine user. Comparison between both groups showed that both group are similar which proved that randomization has succeeded (Table 2).

Treatment Engagement

Multilevel analysis using GEE show a significant difference of score only for understanding parameter (Wald- $\chi^2 = 7.117$; $p = 0.008$), meanwhile for the other two parameters namely homework completion (Wald- $\chi^2 = 1.578$; $p = 0.209$) and participation in session (Wald- $\chi^2 = 3.695$; $p = 0.055$) are not significant. However, form the overall combination of the three parameters showed that there is a significant difference between treatment group thus, accepting the main hypothesis that there is a significant difference in treatment engagement between TAU+CM group with TAU group in the 16 weeks of study (Wald- $\chi^2 = 8.228$; $p = 0.004$) (Figure 2).

Table 2: BASELINE CLINICAL CHARACTERISTICS

Variables ^a	TAU Controlled Group (n=22)	CM+TAU Experimental Group (n=22)
Drugs use starting age	24.3 (5.2)	23.4 (5.3)
Period of addiction	4.1 (2.0)	4.9 (2.7)
Reason for using (%)		
Peer influence	34.8	50.0
Wanted to try	60.9	40.9
Family problem	4.3	4.5
Others	0	4.5
First time getting treatment in CCRC (%)	100	100
Type of drug (% meth)	100	100
The severity of Dependence Scale (SDS)	1.3 (0.4)	1.4 (0.6)
Treatment Motivation (TMQ)		
External Motivation	4.9 (1.1)	4.7 (1.2)
Internal Motivation	4.5 (1.0)	4.4 (1.0)
Help	5.9 (1.0)	5.8 (1.1)
Confidence	4.1 (1.4)	4.0 (1.2)

^aValues are mean (SD), otherwise declared.

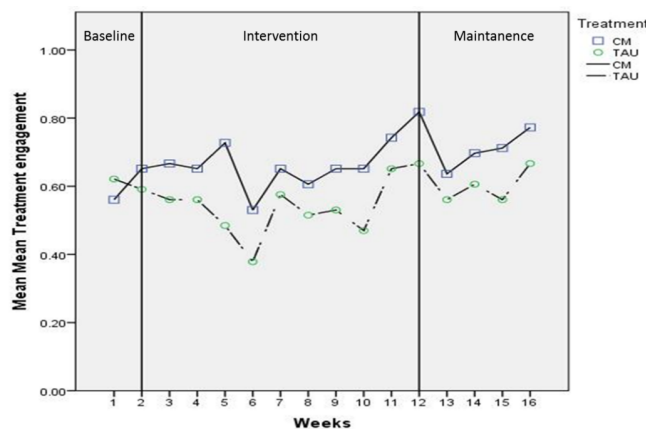


Figure 2: Comparison of treatment engagement between TAU+CM group and TAU group

Treatment motivation

Patients' treatment motivation was measured at pre, post, maintenance phase and follow up at four months after intervention. The results of a One-Way Repeated Measures ANOVA show that CM have a significant effect toward treatment motivation, $F(1,42) = 5.079, p < .001$ and there was also a significant difference in time between patients $F(2.532, 106.342) = 19.104, p < .001$. Partial Eta Squared effect size for the four-time point was ($\eta_p^2 = .313$) and for the treatment effect was ($\eta_p^2 = .108$) indicated that CM had a substantial effect for both time and treatment groups.

Internal Motivation

The results of a One-Way Repeated Measures ANOVA showed that CM had a significant effect toward patients' internal motivation at the four-time point ($F(2.246, 94.352) = 16.439, p < .001$) and a significant between group of treatment effect ($F(1,42) = 6.564, p < .05$) Partial Eta Squared effect size for the four-time point was ($\eta_p^2 = .281$) and for the treatment effect was ($\eta_p^2 = .135$) indicated that CM had a large effect size for both time and treatment groups. The estimated marginal means of the patients' internal motivation showed that both group had an upward trend. However, the TAU+CM group had a higher significant differences between the TAU group especially when CM intervention were administered and posttest (Figure 3).

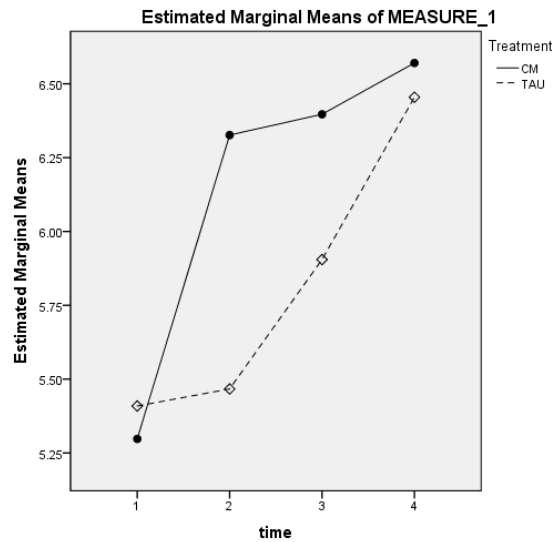


Figure 3: Internal motivation between TAU+CM group and TAU group at four time point

External Motivation

External motivation result showed that CM also had a significant effect toward external motivation on time of measurement ($F(3, 126) = 9.440, p < .001$) and between treatment group ($F(1, 42) = 4.071, p = .05$). Partial Eta Squared effect size for the four-time point was ($\eta_p^2 = .184$) had a large effect however for the treatment group comparison was ($\eta_p^2 = .088$) indicated that it had a medium effect size. The TAU+CM group have a higher external motivation during post test due to CM reinforcement using reward as the source of motivation. However, at follow-up test at one month and four month showed a gradually reduction of mean as compared to the TAU group which showed an upward trend during one and four-months follow-up test (Figure 4).

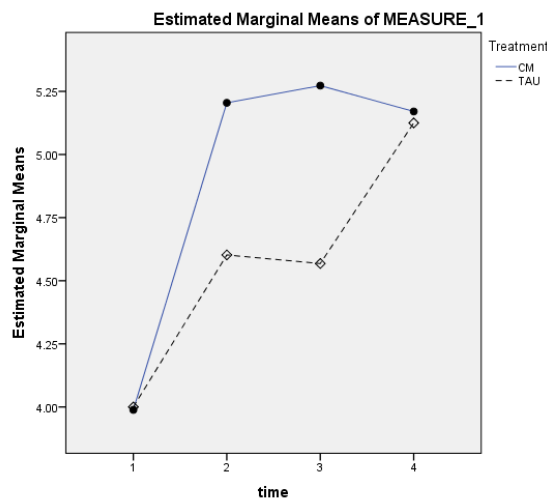


Figure 4: External motivation between TAU+CM group and TAU group at four time point

Help seeking and confidence in treatment

Help seeking and confidence in treatment were the other subscales in the TMQ used to analytically support both type of motivation. Using the results of a One-Way Repeated Measures ANOVA show that CM have a significant effect on patients' help seeking and confidence in treatment based on time of measurement. However, comparison between treatment group on the two-subscale found that there are no significant differences found. TAU+CM group found to have higher level of help seeking and confidence in treatment compared to the TAU group.

Participant's experience of CM intervention

From the semi-structured interview conducted on seven participants found that all participants mentioned that while the reward itself is helpful as an added incentive for them, they felt that they were not really after the reward itself but rather what they have learned during their classes is more important. For them, reward is just an addition and that their motivation to change increased regardless of the rewards. All participants mentioned that they have realized their past mistakes during their CM therapy sessions. They reported that CM provides them strength within themselves to change their lifestyle and behavior after leaving the rehabilitation center. The rewards have given participants extra encouragement to change their addiction patterns. Five out of seven participants find more strength to change their addictive behavior and feel more confident to apply the knowledge learned in the treatment session. One of the participants stated that the reward-based system has made him realize that he can still change despite his previous addiction to meth. Six out of seven participants shared that they had positive feelings and looking forward to attending each treatment session and motivated to implement their recovery knowledge outside the CCRC.

DISCUSSION

Overall results showed that there are a significant difference in treatment engagement and treatment motivation between the two experimental groups (TAU+CM vs TAU). The finding of this study supported the main hypothesis and has proven the effectiveness of CM in the local context of Malaysian treatment setting especially in a mandatory treatment center.

CM at a mandatory treatment center, focusing on positive behavior during the treatment session are rarely researched. Most CM studies were done at an outpatient or community based setting targeting abstinence and adherence to treatment (Benishkek et al., 2014; Davis et al., 2016; Prendergast et al., 2006). The objective of the study was to provide empirical evidence that support and strengthen the positive and active involvement of the patient in a mandatory treatment program using CM reinforcement. The result also showed that from the first to the twelfth week of CM interventions there was an increase in treatment engagement compared to the TAU control groups. This finding support the previous studies which found CM improved the effectiveness of existing programs as opposed to only the usual programs (Gray et al., 2011; Winstanley et al., 2011).

Motivation assessment using TMQ found significant differences between TAU+CM groups with TAU at pre, post, maintenance and follow-up tests. This clearly showed that CM interventions have a positive effect on the patients' motivation during treatment programs and accepted the hypothesis that CM has a positive effect toward patients' motivation. Internal motivation were also found to be significant between both group which are consistent with study conducted by (Cameron et al., 2001), and (Promberger and Marteau, 2013), which states that external rewards can increase intrinsic motivation. (Cameron et al., 2001) believes that rewarding patients for their accomplishment in a low-interest task such as related to treatment and rehabilitation helped improve internal motivation in the long run by cultivating interest toward the activity after they have experienced the positive effect of the task. This finding also refutes the views of (Deci et al., 1999) which believe that an individual is not intrinsically motivated through rewards and behavior will return to the original form after the reward is stopped.

LIMITATION

As mentioned earlier, this study was the first CM study in Malaysia, one of the obstacles that researchers face was the lack of reference in the local context primarily in determining the appropriate magnitude for CM reinforcer. Petry et al., (2015) found that the standard magnitude of \$ 300 was also found to be efficacious compared to a higher magnitude of \$ 900. Some studies also suggest that increasing the magnitude of reinforcer can improve the effectiveness of CM (Ghitza et al., 2008). However, previous studies in the west and developed countries does not fit as a guideline to determine the magnitude of CM reinforcer in the local context of Malaysia for this study. Another limitation of the study was in mitigating the impact of coercion and encouraging free will during the study such as informing the subject that there was no punishment for not complying with the treatment protocol. According to Gendreau et al., (2014), found that one of the principles in carrying out the CM approach in a controlled environment such as a prison is that positive reinforcement must dominate the effect of punishment through a ratio of 4: 1 or higher. In this case, although the CCRC is not as tough as a prison, the positive effect of CM's reinforcement still unable to overcome the effects of punishment.

SUGGESTION FOR FUTURE RESEARCH

It is hoped that this study will generate more interest in conducting CM research in the future. Although it has taken into account the power analysis, it is still considered as small sample size. Larger sample sizes are suggested to obtain more accurate and comprehensive findings on CM effectiveness. Financial resources also need to be considered as CM requires a much higher cost if the sample size is increased. However, the implementation of a lower costs CM can be studied similar to previous studies (Branson et al., 2012; Petry & Martin, 2002). In addition, the determination of greater reward value may need to be considered in order to see the difference in effect based on the value of rewards as reviewed by Ghitza et al., (2008) which highlights the higher the magnitude of the rewards will increase CM effectiveness.

SOCIAL IMPLICATIONS

Drug addiction is an endless problem that cost billions of Ringgit in Malaysia. The countries have spent lots of money in providing treatment and rehabilitation for substance use disorder and drug addicts. These spending if can be reduce can be used for the benefit of other thing in this country such as helping the poor and needed. With the notion that CM can motivate and engaged clients for treatment will help treatment be more successful in the long run. The increasing number of substance user who are in recovery and the reduction of relapse cases will help the country save money in the long run by lowering the cost of medical and legal case and other social issue such as crime caused by substance used disorders.

NOVELTY OF THE STUDY

From extensive literature done on the topic of CM, this study is considered as the first study that study the effectiveness of CM in Malaysia. From previous literature, the issue of CM with motivation only been highlighted a couple of time in relation to CM research. However, it did not directly highlight the relationship or the impact of CM in enhancing intrinsic motivation. The novelty of this study focusses on enhancing intrinsic motivation on patient undergoing CM intervention. This research expanded the best practice approach based on behavior modification using CM intervention not only in Malaysia but also in this part of the region.

CONCLUSION

CM is an evidence-based intervention that can enhance motivation toward treatment programs especially in a coerce environment of a mandatory treatment centre. This study provides knowledge input from the Malaysian perspective and help broaden the knowledge of local addiction professionals in implementing the various approaches of treatment and rehabilitation. The addiction professionals will have more alternatives intervention that suit their patients' requirement.

[Mohamed et al. \(1998\)](#)

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