

Congruence couple therapy for alcohol use and gambling disorders with comorbidities (part II): Targeted areas and mechanisms of change

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Abstract

Study of change mechanisms is important to advance theory development and to reveal the active components that make a critical difference in treatment. Improved outcomes in a randomized controlled trial that favored Congruence Couple Therapy (CCT) vs individual-based Treatment-as-Usual (TAU) were correlated within each group. Partial correlations were used to test for mediation effects. The aggregate correlation coefficient of improved variables in addiction and mental health, couple adjustment, emotion regulation (ER) and life stress was moderate for CCT and weak for TAU. CCT showed greater number of mediating effects among improved variables than TAU. The prominence of the process mechanism of improved ER with its mediating effects for addiction and psychiatric symptoms evidenced in both groups is noteworthy, but ER improvement was significantly associated with improved couple adjustment only in CCT. Reduction in life stress in CCT was associated with a broader range of improvements in CCT compared to TAU. Correlation patterns were substantiated by CCT participants' endorsement of treatment targets emphasizing relationship, communication, emotion, problem solving, addiction and intergenerational issues of trauma. TAU participants reported significantly lower endorsements for these

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treatment targets. The correlation of ER and couple adjustment suggested as a key process mechanism should be further elucidated in future studies to differentiate relationship-based vs individual-based models and their respective outcomes for primary clients and partners. These findings are considered preliminary, requiring larger samples and advanced modelling among variables to provide a more profound mechanism analysis.

KEYWORDS

adverse childhood experience, alcohol use disorder, comorbidities, Congruence Couple Therapy, couple adjustment, emotion regulation, gambling disorder, randomized controlled trial, substance use, therapeutic mechanism

INTRODUCTION

Identifying mechanisms of change in psychotherapeutic treatment models has theoretical and practical implications, especially for addictive disorders with their complex set of comorbidities (Najt et al., 2011; Yakovenko & Hodgins, 2018). Study of change mechanisms is important to advance theory and to reveal the active components that make a critical difference in treatment. Researchers of psycho-social interventions in addiction and psychotherapy have urged the studies of mechanisms (Finney, 2018; Longabaugh et al., 2013) especially as part of randomized controlled trials (RCT) to identify elements that make an intervention more efficacious than the control. Results from a recent RCT of Congruence Couple Therapy (CCT), a humanistic, integrative, systemic intervention for alcohol and gambling disorders and their comorbidities, indicate CCT's advantage over individual-based Treatment-as-Usual (TAU) in reducing symptoms of addiction and psychiatric functioning, couple adjustment, emotion regulation (ER), and life stress (Lee et al., 2022). In the present study, we inquire into the potential change mechanisms of CCT as a systemic model to understand what contributes to its greater effects over individual-based TAU.

Congruence couple therapy: a program of research

Research on Congruence Couple Therapy has spanned two decades, beginning with its first case studies series of eight couples involving a pathological gambling member (Lee, 2002). This early research laid out the theoretical and therapeutic blueprint for Congruence Couple Therapy. Based on the in-depth qualitative analysis of this foundational study, a relational framework of pathological gambling was proposed that elucidates the recursive interactive nature of couple difficulties with pathological gambling (Lee, 2014). When couples practiced congruence in the four dimensions of intrapsychic, interpersonal, intergenerational, and universal-spiritual alignment, extrication from the vicious recurring cycle of addiction and couple distress became possible (Lee, 2015).

Counselor training in CCT produced a significant increase in counselors' systemic knowledge and skills compared to randomized waitlisted counselors (Lee et al., 2008). Following training, effectiveness of CCT was demonstrated in a mixed-method cohort study delivered by the trained CCT counselors, resulting in reduced gambling symptoms and improved couple adjustment (Lee & Rovers, 2008). A subsequent pilot RCT demonstrated CCT's efficacy in producing significant treatment effects for gambling symptoms, mental distress, and family

systems function compared with minimal intervention controls (Lee & Awosoga, 2015). CCT has been favorably received by gamblers, spouses, and counselors in all studies with high levels of satisfaction reported by these groups, demonstrating its acceptability as a treatment model (Lee et al., 2008, 2022; Lee & Awosoga, 2015; Lee & Rovers, 2008). The current mechanism study of CCT is based on the results of a two-year RCT conducted at two provincial addiction outpatient clinics in Canada (Lee et al., 2022).

Congruence couple therapy: a humanistic integrative systemic model of change

CCT builds on the work of Virginia Satir (1916–1988), a highly influential pioneer in family therapy. CCT conceptualized and further developed Satir's vehicles of change (Satir et al., 1991) into an integrated, structured, and systemic four-dimensional framework that has been manualized and applied to addiction treatment and research. CCT's core concept of congruence consists of four dimensions: the intrapsychic, interpersonal, intergenerational, and universal-spiritual (see Figure 1). This four-dimensional model was developed iteratively from a series of theoretical, empirical, and clinical studies (Lee, 2015). CCT views clinical symptoms as the result of the disconnections or incongruences that exist within and among the four dimensions (Bastardo-Gaelzer, 2019; Lee, 2015). Congruence establishes such connections with the 4 A's: attention, awareness, acknowledgment, and alignment (Lee, 2009).

CCT views addiction as a symptom of relational disruption that thwarts the universal-spiritual human need for connection, safety, and worth. The couple relationship is the site where the effects of the relational ruptures of adverse childhood experiences (ACE) of abuse, neglect, loss, and abandonment are played out. Patterns of emotion dysregulation, incongruent communication, perceptual, and cognitive distortions in one or both partners elevate stress, triggering the use of substances and addictive behaviors for their psychoactive effects on the brain for mood and emotion regulation. As a systemic model, CCT targets the four dimensions and their linkages to promote greater congruence to improve ER, couple relationship and self-worth. In doing so, the impact of ACE is mitigated.

CCT interventions capitalize on strategic moments to articulate linkages among the four dimensions in the couple's interaction and raise awareness of their interconnections. CCT sessions progress across an average of 12 sessions in three phases: Beginning Phase: three sessions for assessment and making initial linkages of the four dimensions; Middle phase: six sessions for deepening and intervening on the mutual influences among the four dimensions;

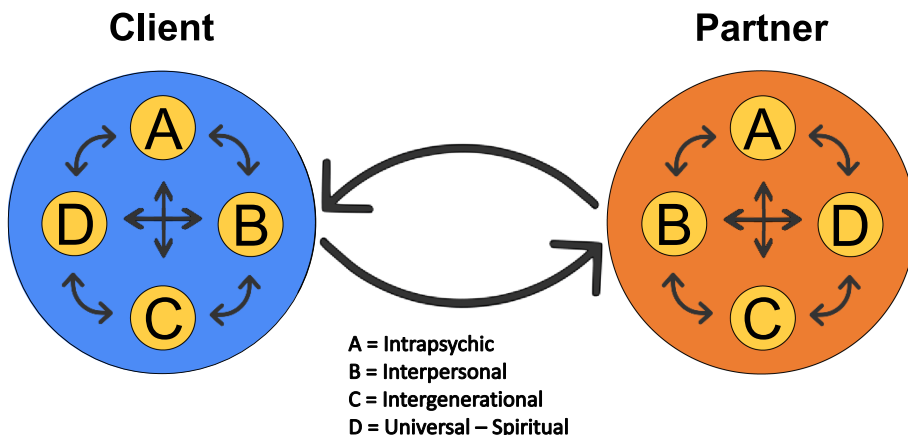


FIGURE 1 Multi-dimensional systemic interventions of Congruence Couple Therapy

and Consolidation phase: three sessions for circular feedback and reflection on changes in the four dimensions with new understanding of self, other and addiction (Lee, 2016). Further description of CCT concepts with case illustrations are provided in other CCT publications (Lee, 2009, 2015; Lee et al., 2022).

The hallmark of CCT that differentiates it from individual-based TAU is the treatment of addiction using a conjoint couple format that addresses the couple's interactive processes based on CCT's four dimensions. Changes are made in the interaction of the two members of a couple unit rather than individually. The results of the RCT showed that this conjoint format yielded improvement in both members of the dyad on nine outcome measures while TAU treating addicted client and partners separately produced fewer and less significant improvements (Lee et al., 2022). In this study, we analyzed the outcomes from the RCT to discern possible mechanisms that made a difference within CCT and TAU groups and mechanisms that differentiated the groups.

Selection of study variables

The theoretical principles and intervention framework of CCT provided the basis for the selection of the nine variables used for the RCT and mechanism analysis: alcohol use and gambling disorders and their commonly co-occurring psychiatric symptoms/functioning, depression, PTSD, couple adjustment, emotion regulation, other substance use, and life stress. Selection of these variables was also supported by a review of the literature. To our knowledge, the interrelationships among these outcomes from an intervention have not been studied together previously in a single study. Most earlier studies on these variables were cross-sectional and have not looked into the mediational effects of longitudinal interrelated change outcomes. A review of the literature on these interrelated variables follows.

Alcohol use disorder (AUD) and psychiatric symptoms

Depression and AUD

AUD consistently co-occurs with a range of psychiatric disorders including affective disorders and post-traumatic stress disorder (PTSD; Boden & Fergusson, 2011; Castillo-Carniglia et al., 2019). Among those with major depressive disorder, concurrent past-year AUD prevalence is in the range of 4%–22%, and a lifetime prevalence is 27%–40% (Grant et al., 2015; Lai et al., 2015). Despite the severe symptoms, higher relapse rate, poorer treatment outcomes, and greater psychological and social impairments among those with concurrent disorders (Dauber et al., 2018; Najt et al., 2011), AUD and its comorbidities often remain untreated (Grant et al., 2015).

Post-traumatic stress disorder (PTSD) and AUD

Individuals diagnosed with substance use disorders (SUD) including alcohol and other drugs, are among the groups with highest levels of PTSD (Ford & Smith, 2008; Wisco et al., 2014). Over half of clinical samples diagnosed with PTSD also meet the diagnostic criteria for a lifetime AUD (Brady et al., 2004). The presence of at least one other psychiatric disorder in patients with PTSD and AUD comorbidity results in greater impaired psychological functioning, suicidal attempts, and poorer coping strategies for PTSD symptoms (Nepon et al., 2010). Given the strong comorbidity between PTSD and AUD, routine screening for PTSD has been recommended among those with AUD and vice-versa (Debell et al., 2014).

Gambling disorder (GD) and psychiatric symptoms

Depression and GD

GD is a behavioral addiction (APA, 2013), the onset and progression of which often occur with a variety of psychiatric disorders. Depression is reported to be both a cause and a consequence of GD (Hodgins et al., 2011; Lorains et al., 2011). GD is 74.3% more likely to develop before depression (Hodgins et al., 2011). In light of their common co-occurrence, psychiatric screening for those seeking treatment for GDs is recommended (Lorains et al., 2011).

PTSD and GD

PTSD symptoms are diagnosed in about 11% to 15% of those with lifetime symptoms of GD (Moore & Grubbs, 2021). Also, GD and PTSD comorbidity are higher in treatment and socio-economically vulnerable groups (Ledgerwood & Milosevic, 2015; Moore & Grubbs, 2021). Furthermore, PTSD and GD symptom severity are positively correlated, and their co-occurrence increases the risk of expressing other psychiatric disorders, including depression, anxiety, and SUD (Moore & Grubbs, 2021). Hence, those presenting with GD and PTSD comorbidity are recommended as a priority for treatment (Moore & Grubbs, 2021).

AUD comorbid with GD

AUD has the strongest comorbidity with GD among SUD with up to 73% of problem and pathological gamblers exhibiting AUD (Lorains et al., 2011; Petry et al., 2005). Problem and pathological gamblers are six times more likely than non-gamblers to meet AUD diagnostic criteria in their lifetime (Hodgins et al., 2011). However, despite extensive literature on AUD and GD comorbidity, there is no conclusive evidence on the directionality and mechanisms of this association (Hodgins et al., 2011; Lorains et al., 2011).

Life stress, AUD, and GD

Epidemiological studies indicate that exposure to stressful life increases alcohol consumption (Keyes et al., 2011) and gambling-related problems (Roberts et al., 2017). Drinking, gambling, and other maladaptive behaviors are often used to cope with stressors (Buchanan et al., 2020; Keyes et al., 2011). Additionally, life transitions (e.g., parenthood, marital separation, loss of a partner, and retirement) increased risk of developing and relapsing from both AUD and GD, particularly for those with poor coping and problematic couple communication (Lee, 2014; Satre et al., 2012). Using drinking (Windle & Windle, 2015) and gambling (Wang et al., 2020) as coping motives of stressful life events increases problem drinking and gambling levels.

Couple adjustment, AUD, and GD

Marital distress is commonly reported with AUD and GD (Bekircan & Tanriverdi, 2020; Hodgins et al., 2007). Higher divorce rate, intimate partner violence, and communication problems are found with both AUD (Leonard & Eiden, 2007) and GD (Black et al., 2012; Dowling et al., 2016)

Emotion regulation, AUD, and GD

Effective ER is necessary to manage marital distress, divorce, conflicts, victimization, and other life adversities (Fischer & Manstead, 2008; Kim & Hodgins, 2018). Both theory and empirical evidence suggest that effective ER is undermined by alcohol use and gambling (Kim & Hodgins, 2018). Inability to identify, interpret, express and regulate emotions to manage and cope with difficult situations is strongly linked to development of SUD and GD (Dingle et al., 2018; Poole et al., 2017; Rogier et al., 2020). AUD and GD commonly co-exist with emotion dysregulation (Jakubczyk et al., 2018; Williams et al., 2012).

Adverse childhood experience (ACE), AUD and GD

Many studies have linked ACEs such as abuse, neglect, and household dysfunction to adulthood disorders, including SUD (Felitti et al., 1998; Hughes et al., 2017) and GD (Lane et al., 2016; Poole et al., 2017). Overall risk of alcohol and other substance use disorders is increased among those with ACE (Felitti et al., 1998; Hughes et al., 2017). Similar influences of ACE apply to GD (Hughes et al., 2017; Sharma & Sacco, 2015) with an estimated 23%–82% of treatment-seeking problem gamblers reporting ACE (Hodgins et al., 2010; Poole et al., 2017). ACE is also associated with early age onset of gambling, gambling frequency, and greater overall severity of gambling-related problems (Hodgins et al., 2010; Petry & Steinberg, 2005).

In sum, all the psychiatric, process and contextual outcomes measured in the RCT that enter into the present mechanism analysis demonstrate a strong relationship to AUD and GD based on the existing literature.

METHOD AND INSTRUMENTS

We used correlations and partial correlations to detect the mechanisms of therapeutic changes to help explain CCT's clinical advantage relative to TAU, based on the results of the RCT (Lee et al., 2022). The sample comprising 23 couples ($N = 46$ individuals) who met the screening criteria were randomly assigned to the CCT or TAU group at two Canadian outpatient addiction clinics. Data collection of primary clients and partners occurred at baseline (O1), 5-month post-treatment (O2), and 8-month follow-up (O3) via a Qualtrics survey. The trial was approved by the University of Alberta Health Research Ethics Board—Health Panel (#Pro00062248).

Participants' recruitment and screening

Participants were recruited via posters, tele-info screens, and referrals by addiction counselors and treatment services. For more details on the recruitment, inclusion criteria, screening instruments, and the CONSORT randomization flowchart for the RCT, see Part I (Lee et al., 2022).

Experimental vs control group

The description of CCT principles, concepts and interventions was provided in earlier sections and in the main companion article (Lee et al., 2022). TAU consists of an eclectic

set of individually based approaches of motivational interviewing, cognitive-behavioral and solution-focused therapy, relapse prevention training, and trauma-informed interventions routinely used in the addiction and mental health services in the health system. Some TAU participants also accessed 12-step programs during their treatment. Primary clients and their partners were seen separately on an individual basis in the TAU program.

CCT participants completed an average of 13 CCT sessions and TAU participants received an average of 8 counseling sessions consisting of a combination of the following: one-on-one counseling with a TAU counselor, family support groups, and psychoeducation programs. The number of treatment sessions in TAU and CCT showed no group differences on the primary and secondary outcomes ($p > 0.05$) based on ANCOVA analysis.

Instruments

Participants were required to meet DSM-5 diagnostic criteria for alcohol use disorder or gambling disorder for inclusion into the study. Refer to Part I for detailed descriptions of the validated instruments for outcome measurements.

To measure alcohol use, we relied on the *Alcohol Use Disorders Identification Test* (AUDIT; Saunders et al., 1993); substance use excluding alcohol, *The Alcohol, Smoking, and Substance Involvement Screening Test* (ASSIST; World Health Organization, 2002); for psychiatric symptoms and functioning, *Behavior, and Symptom Identification Scale* (BASIS; McLean e-BASIS-24, 2006); for problem gambling, *Problem Gambling Severity Index* (PGSI; Ferris & Wynne, 2001). To measure depression, we used *Patient Health Questionnaire-9* (PHQ-9; Kroenke et al., 2001); post-traumatic stress (PTSD), *Post-traumatic Stress Disorder Checklist for DSM-5* (PCL-5; Ashbaugh et al., 2016); couple adjustment, *Dyadic Adjustment Scale* (DAS; Spanier, 1976); for ER, *Difficulties in Emotion Regulation Scale* (DERS; Gratz & Roemer, 2004); and for life stress, the *Social Readjustment Rating Scale* (SRRS; Holmes & Rahe, 1967). For ACE, we used the *Jacobs Neglect, Abandonment, and Abuse Protocol (JNAAP; Jacobs, 2002)*.

RCT outcomes

Overall, CCT demonstrated stronger and more clinically significant improvement in addiction and psychiatric symptoms, couple adjustment, emotion regulation and life stress relative to TAU in the RCT (Lee et al., 2022). For adherence and fidelity, we held weekly group consultations via teleconferences with CCT counselors. Counselors' case notes were reviewed with comments by the principal investigator. Counselors' average adherence was rated by three research team members as 7 out of 10 on a 10-point scale (10 = highest adherence to CCT target interventions).

Data analysis

Correlations of outcome changes: Clinical, process and contextual variables

Correlation analysis is based on raw change scores between baseline and follow-up (O3-O1) in CCT ($n = 23$) and TAU ($n = 23$). Clinical variables as defined in this mechanism analysis are alcohol use, gambling, and substance use symptoms, and psychiatric symptoms and function (BASIS, PHQ, PCL). A process variable is defined as "an interpersonal, affective, cognitive, or behavioral factor that is operative during the course of psychotherapy or counseling and

influences the progress or the course of behavior” (APA, 2015). Emotion regulation (DERS) and couple adjustment (DAS) are process variables targeted by CCT because they are deemed to influence addiction and psychiatric symptoms and life stress. Life stress (SRRS) is considered a contextual variable that can influence or is influenced by the therapeutic process and symptomatology.

We used Spearman Rho test for the correlations of improvement in TAU and CCT. Outcome improvements were determined by subtracting O3 raw scores from O1. For outcome variables, lower scores indicate reduced symptoms except for the Dyadic Adjustment Scale where lower scores indicate poorer couple adjustment, but DAS scores were reversed to conform to the same directionality as the other correlations. Statistical significance for correlation analysis was set at *1-tailed* $p < 0.05$ based on the clear directionality of the RCT outcome results reported in Part I and the pilot study (Lee et al., 2022; Lee & Awosoga, 2015). Correlation coefficients were interpreted as weak (<0.3), moderate ($0.3-0.49$), and strong (>0.5 ; Cohen, 2013). An aggregate correlation coefficient was calculated by taking the average of all correlation coefficients separately for CCT and TAU that have equal sample size (Alexander, 1990).

Construction of correlation figures

Two figures (Figures 1 and 2) were created for visualization of the correlations of nine changes in TAU and CCT. The size of each circle approximates the number of significant correlations with other improved variables. The degree of the overlap between the circles approximates the correlation effect sizes as reported in Tables 1 and 2.

Mediation analysis with partial correlation

To test the mediating effects, we used non-parametric partial correlation analysis to estimate the correlation between two variables when the effect of a third variable is controlled (Cohen et al., 2014). This method allows the use of a nonparametric version with small samples (Conover, 1999) while providing a suitable means for exploratory analysis of mediation effects without specification of independent and dependent variables (Field, 2018; Pedhazur, 1997). If the correlation value between the two variables decreases when the mediating variable is partialled out, then a mediating effect could be assumed: a full mediation is considered if the partial correlation is no longer significant, whereas a partial mediation is considered if the partial correlation is reduced but still significant (James & Brett, 1984).

Primary client and partner differences in adverse childhood experiences

The percentage of primary clients and partners reporting a history of ACE was compared using chi-square test.

Intervention areas targeted by CCT and TAU

TAU and CCT participants responded to a survey to endorse nine key therapeutic targets that were addressed in their counseling sessions. These targeted areas were set up in relation to CCT's four-dimensional framework: relationship, communication (interpersonal); feelings, thoughts (intrapsychic), family of origin, trauma, and abuse (intergenerational) and spirituality

(universal-spiritual). Other target areas considered in relation to their treatment were problem-solving and addiction. Between-group differences were determined using chi-square test (see Table 4).

Feedback from participants on their TAU and CCT treatment

Participants' qualitative perspectives and feedback on what was most memorable and beneficial in their treatment experience were analyzed by content analysis of key words, followed by quantification of the frequency of a content category.

Research question

What mechanisms differentiate CCT systemic interventions vs TAU individual-based treatment?

Hypotheses

Correlation hypotheses

1. Improvement in process variables of ER and couple adjustment distress will be positively correlated with improvement in symptoms of addiction, psychiatric functioning, and life stress in CCT and TAU. 2. Improvement in ER and couple adjustment distress will be positively correlated with each other in CCT but not TAU. 3. Improvement in addiction and psychiatric symptoms will be positively correlated in CCT and TAU. 4. CCT will demonstrate stronger and more statistically significant correlations between improved symptoms than TAU.

Partial correlation mediation hypotheses

To continue with the hypotheses: 5. The process variables ER and couple adjustment will mediate improvement in symptoms of addiction and psychiatric disorders in CCT and not in TAU. 6. Addiction symptoms and psychiatric symptoms will mediate each other. 7. ER and couple adjustment will mediate each other.

RESULTS

Demographic and baseline characteristics

The control (TAU) and experimental (CCT) groups had equivalent baseline demographic and symptom characteristics ($p > 0.05$), indicating successful randomization. The sample ($N = 46$) profiled a mean age of 45 years, predominantly Caucasian (87%), female (52.2%), post-secondary graduates (56.5%), unemployed (34.8%), and $> \$100,000$ annual family income (58.7%). Majority of the sample (92%) consisted of paired couples, and most were married (67.4%) or living with a partner (19.6%) for an average of 14.5 years. Primary clients (50%) and partners (46%) reported equivalent ACE history at baseline ($p > 0.05$).

Results on hypotheses

Hypothesis 1: Emotion regulation and couple adjustment (process variables) correlate with clinical improvement and life stress

In TAU (Table 1; Figure 2), improved *ER* correlated significantly with improved gambling disorder (Spearman = 0.459), psychiatric symptoms/functioning (Spearman = 0.519), and depression (Spearman = 0.408). *Couple adjustment* improvement correlated significantly with improved depression (Spearman = 0.456) and psychiatric symptoms/functioning (Spearman = 0.437).

In CCT (Table 2), improved *ER* correlated significantly with improved psychiatric symptoms/functioning (Spearman = 0.349), PTSD (Spearman = 0.566), and depression (Spearman = 0.452). Improved *couple adjustment* correlated significantly with improved psychiatric symptoms/functioning (Spearman = 0.414), depression (Spearman = 0.509), PTSD (Spearman = 0.455), and other substance use (Spearman = 0.465). *ER* and couple adjustment have stronger and more numerous correlations with clinical improvement and reduction of life stress in CCT compared with TAU (see Figures 2 and 3).

Hypothesis 2: Emotion regulation correlates with couple adjustment

Improvement in *ER* and *couple adjustment* correlated significantly with each other in CCT (Spearman = 0.459). They were not correlated in TAU (Tables 1 and 2; see Figures 2 and 3).

Hypothesis 3: Psychiatric symptoms/functioning correlate with addiction

In TAU (Table 1; Figure 2), improved depression correlated significantly with improved gambling (Spearman = 0.490), and improved PTSD correlated significantly with improved other substance use (Spearman = 0.376). In CCT (Table 2; see Figure 3) improved PTSD correlated significantly with improved other substance use (Spearman = 0.538) and alcohol use (Spearman = 0.347).

Hypothesis 4: Aggregate correlations in TAU and CCT

CCT had more statistically significant and stronger correlations than TAU (# = 18 vs. 12 for $p < 0.05$; see Tables 1 and 2 and Figures 2 and 3). The aggregate correlation coefficient for CCT was moderate (Spearman = 0.33); the aggregate correlation coefficient for TAU was weak (Spearman = 0.25).

Hypotheses 5, 6, 7: Partial correlation mediation effects

First, in TAU, partial correlation results showed improved *ER* (DERS) outcome having a full mediating effect on improved psychiatric symptoms/functioning (BASIS) (Spearman = 0.70 vs. 0.39) and a partial mediating effect on depression (PHQ) (Spearman = 0.66 vs. 0.46). In CCT, improved *ER* showed mediation effects in both addiction and psychiatric symptoms: a full mediation effect of improved *ER* (DERS) on improved alcohol use (AUDIT) (Spearman = 0.53 vs. 0.29) and other substance use (ASSIST) (Spearman = 0.41

TABLE 1 TAU Spearman correlations of change scores (baseline to follow-up; $n = 23$)

	Alcohol (AUDIT)	Problem gambling (PGSI)	Other substances (ASSIST)	Depression (PHQ-9)	Psychiatric symptoms (BASIS)	PTSD (PCL-5)	Dyadic adjustment (DAS)	Emotion dysregulation (DERS)
Correlation coefficient (p -value)								
AUDIT	–	–	–	–	–	–	–	–
PGSI	0.244 (0.131)	–	–	–	–	–	–	–
ASSIST	0.281 (0.102)	0.111 (0.311)	–	–	–	–	–	–
PHQ-9	0.108 (0.312)	0.490 (0.009)	0.017 (0.469)	–	–	–	–	–
BASIS	0.079 (0.361)	0.240 (0.135)	0.137 (0.272)	0.655 (0.001)	–	–	–	–
PCL-5	0.008 (0.486)	0.113 (0.304)	0.376 (0.042)	0.391 (0.033)	0.498 (0.008)	–	–	–
DAS	0.026 (0.454)	0.178 (0.208)	0.042 (0.426)	0.456 (0.014)	0.437 (0.019)	0.051 (0.408)	–	–
DERS	0.216 (0.161)	0.459 (0.014)	0.049 (0.414)	0.408 (0.027)	0.519 (0.006)	0.210 (0.168)	0.252 (0.123)	–
SRRS	0.112 (0.305)	0.166 (0.224)	0.258 (0.123)	0.119 (0.294)	0.375 (0.039)	0.311 (0.075)	0.425 (0.022)	0.319 (0.069)

Note: Bolded correlations are statistically significant at 0.05. Aggregate correlation coefficient Spearman = 0.25.

TABLE 2 CCT Spearman correlations of change scores (baseline to follow-up; $n = 23$)

	Alcohol (AUDIT)	Problem gambling (PGSI)	Other substances (ASSIST)	Depression (PHQ-9)	Psychiatric symptoms (BASIS)	PTSD (PCL-5)	Dyadic adjustment (DAS)	Emotion dysregulation (DERS)
Correlation coefficient (p -value)								
AUDIT	-	-	-	-	-	-	-	-
PGSI	0.216 (0.162)	-	-	-	-	-	-	-
ASSIST	0.391 (0.033)	0.021 (0.463)	-	-	-	-	-	-
PHQ-9	0.109 (0.310)	0.067 (0.381)	0.087 (0.347)	-	-	-	-	-
BASIS	0.216 (0.161)	0.154 (0.242)	0.325 (0.065)	0.691 (0.001)	-	-	-	-
PCL-5	0.347 (0.052)	0.311 (0.074)	0.538 (0.004)	0.353 (0.049)	0.170 (0.219)	-	-	-
DAS	0.094 (0.335)	0.226 (0.150)	0.465 (0.013)	0.509 (0.007)	0.414 (0.025)	0.455 (0.015)	-	-
DERS	0.192 (0.190)	0.203 (0.177)	0.312 (0.074)	0.452 (0.015)	0.349 (0.051)	0.566 (0.002)	0.459 (0.014)	-
SRRS	0.287 (0.092)	0.336 (0.058)	0.421 (0.023)	0.360 (0.046)	0.305 (0.078)	0.589 (0.002)	0.494 (0.008)	0.437 (0.018)

Note: Bolded correlations are statistically significant at 0.05. Aggregate correlation coefficient Spearman = 0.33.

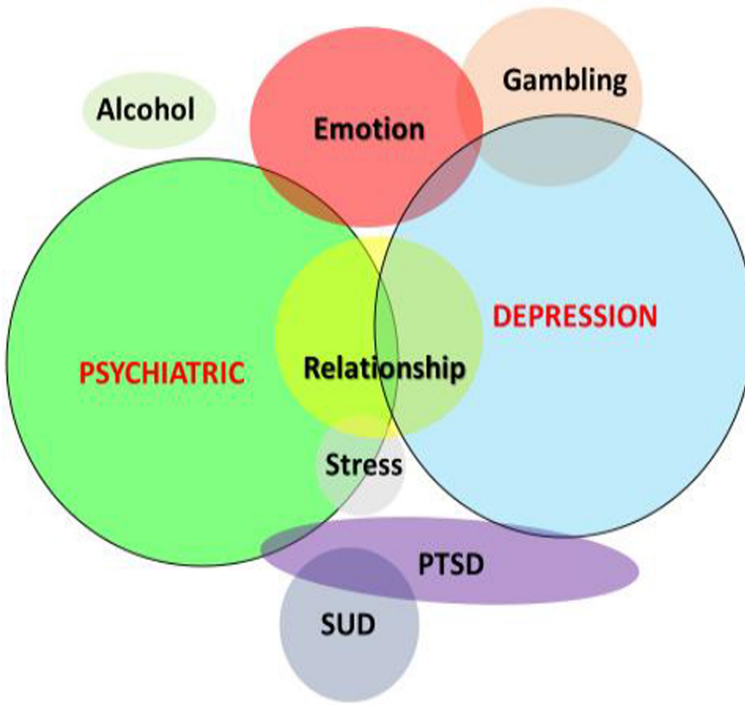


FIGURE 2 TAU change correlations ($n = 23$)

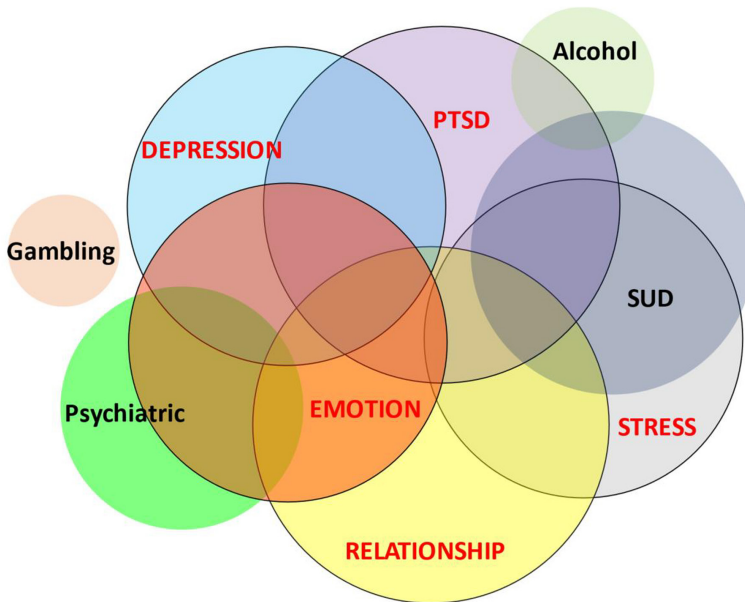


FIGURE 3 CCT change correlations ($n = 23$)

TABLE 3 Spearman bivariate and partial correlation matrix for all variables across TAU and CCT

	Process and context mediation				Psychiatric mediation				Addiction mediation			
	Zero-order correlations		DAS		BASIS		PHQ		AUDIT		ASSIST	
	O1xO3	partialled	partialled	partialled	partialled	partialled	partialled	partialled	partialled	partialled	partialled	partialled
TAU change outcomes												
AUDIT	0.73***	0.67**	0.75***	0.75***	0.69***	0.62**	0.62**	0.62**	—	0.71***	0.74***	0.74***
PGSI	0.69***	0.69***	0.69***	0.67**	0.67**	0.68***	0.67**	0.67**	0.63**	—	0.59**	0.59**
ASSIST	0.79***	0.79***	0.80***	0.80***	0.75***	0.68***	0.77***	0.77***	0.75***	0.78***	—	—
BASIS	0.70***	0.39	0.73***	0.71***	—	0.22	0.47*	0.47*	0.61**	0.71***	0.59**	0.59**
PHQ	0.66**	0.46*	0.63**	0.67**	0.36	—	0.49*	0.49*	0.59**	0.69***	0.54*	0.54*
PCL	0.37	0.02	0.09	0.33	0.29	0.22	—	—	0.39	0.41	0.40	0.40
DERS	0.75***	—	0.75***	0.76***	0.61**	0.63**	0.62**	0.62**	0.69***	0.75***	0.76***	0.76***
DAS	0.82***	0.83***	—	0.81***	0.83***	0.82***	0.86***	0.86***	0.82***	0.79***	0.85***	0.85***
SRRS	0.44*	0.43*	0.46*	—	0.41*	0.37	0.43*	0.43*	0.44*	0.41*	0.41*	0.41*
CCT change outcomes												
AUDIT	0.53*	0.29	0.54*	0.50*	0.52*	0.44*	0.53*	0.53*	—	0.52*	0.48*	0.48*
PGSI	0.49*	0.49*	0.50*	0.45*	0.48*	0.52*	0.51*	0.51*	0.47*	—	0.41	0.41
ASSIST	0.41*	0.33	0.45*	0.37	0.33	0.31	0.46*	0.46*	0.34	0.35	—	—
BASIS	0.64**	0.48*	0.68***	0.62**	—	0.59**	0.63**	0.63**	0.57**	0.65**	0.65**	0.65**
PHQ	0.56**	0.41*	0.68***	0.50*	0.37	—	0.55**	0.55**	0.51*	0.56**	0.52*	0.52*
PCL	0.08	0.09	0.01	0.11	0.09	0.08	—	—	0.11	0.08	0.07	0.07
DERS	0.47*	—	0.69***	0.47*	0.35	0.39	0.52*	0.52*	0.22	0.49*	0.43*	0.43*
DAS	0.64**	0.62**	—	0.64**	0.61**	0.64**	0.67**	0.67**	0.64**	0.67**	0.67**	0.67**
SRRS	0.36	0.36	0.37	—	0.34	0.31	0.39	0.39	0.35	0.36	0.31	0.31

Note: Significant mediating effects are shown in bold.

* $p < 0.05$; ** $p < 0.01$; *** $p < 0.001$.

vs. 0.33); a partial mediation effect on improved psychiatric symptoms/functioning (BASIS) (Spearman = 0.64 vs. 0.48) and depression (PHQ) (Spearman = 0.56 vs. 0.41). Improved life stress (SRRS) also fully mediated other substance use improvement (ASSIST) (Spearman = 0.41 vs. 0.37) in CCT.

Second, improved psychiatric symptoms/functioning (BASIS) (Spearman = 0.41 vs. 0.33) and depression (PHQ) (Spearman = 0.41 vs. 0.31) fully mediated improved other substance use (ASSIST) in CCT. Conversely, addiction symptom improvement did not mediate any psychiatric improvement. No mutually mediating effects were found between addiction and psychiatric symptom improvement in TAU. Third, ER (DERS) and couple adjustment (DAS) improvement did not significantly mediate each other's improvement in both TAU and CCT ($p > 0.05$; see Table 3). Overall, a higher number of improved outcomes were observed for mediating effects for a range of outcomes in CCT (14 mediating effects) compared with TAU (7 mediating effects).

Targeted areas in TAU and CCT sessions

At post-treatment, we asked TAU and CCT participants which areas of their functioning were targeted by their respective counseling sessions during treatment (Table 4). The analysis revealed a significant difference between the TAU and CCT groups. A high number of CCT participants (83%–96%) endorsed seven of nine targeted areas in their treatment, including relationship, communication, feelings, thoughts, problem-solving, addiction, and family of origin, corresponding to the theoretical framework of CCT. Seventy percent of CCT participants endorsed abuse and trauma as having been addressed. In comparison, between 70% and 78% of TAU participants endorsed five areas of relationship, communication, addiction, feelings, and thoughts in their counseling. Problem-solving was reported by 44% in TAU compared to 91% in the CCT group. The least endorsed areas (13%–17%) in the TAU groups were family of origin, spirituality, trauma, and abuse. Mann–Whitney U tests showed significant group differences in all the endorsed target areas ($\text{all } p < 0.001$).

TABLE 4 Treatment targets endorsed by TAU and CCT participants ($N = 46$)

Targeted areas	TAU ($n = 23$) Percentage (%)	CCT ($n = 23$)	Group difference (%)
Relationship	78	96	18
Communication	70	96	26
Feelings	78	96	18
Thoughts	74	91	17
Problem-solving	44	91	47
Addiction	70	87	17
Family of origin	13	83	70
Trauma and abuse	17	70	53
Spirituality	13	22	9

Note: p -Value is < 0.05 for all chi-square tests of the TAU and CCT differences in targeted areas.

TABLE 5 Content frequency from open-ended qualitative feedback on beneficial treatment areas ($N = 46$)

Content citation	TAU ($n = 23$)	CCT ($n = 23$)	Group difference (%)
	Frequency of citation (%)		
Communication	11	82	71
Relationship	38	82	44
Therapeutic alliance	44	60	16
Strength-based	39	45	6
Self-awareness	38	41	3
Emotion	17	36	19
Family of origin	0	14	14
Understanding	13	45	32

Note: p -Value is <0.05 for all chi-square tests of TAU and CCT differences.

Open-ended short feedback from participants on their treatment

We inquired into memorable and beneficial aspects in the participants' treatment experience with two open-ended survey questions. The differences between CCT and TAU groups in the frequency of content areas are displayed in Table 5 and are statistically significant ($X^2 = 84.661$, $p < 0.001$).

CCT participants highlighted as beneficial the “congruence” and “directness” of their counselors' communication. They also referenced the CCT counselors' “humour,” “compassion,” and “genuine humanity” while TAU participants mentioned their counselors' “calm,” “support,” “caring,” and “positive” attitude. CCT participants most frequently cited as beneficial and memorable in their therapy were communication (82%) and relationship (82%; Table 5). These changes occurred in the context of talking and listening to each other, taking responsibility for one's thoughts and feelings, compassion and understanding of self and the partner, and communication practice. Communication in TAU referenced individual assertiveness and boundary setting. Family of origin work was not mentioned in the TAU group but featured in comments in CCT (14%). CCT group further commented on their increased “understanding” (45% of responses) in relation to themselves, their partner, their relationship and addiction, and their adverse childhood experience, suggesting they have gained a holistic understanding of their addiction and the different dimensions that fed into it. Reference to “understanding” was not found in TAU. In sum, the quantification of content analysis corroborated with the targeted treatment areas endorsed by the two groups in the survey responses (Table 4).

DISCUSSION

In this study, we aimed to detect the mechanisms that make CCT, a systemic model, more effective in producing significant clinical outcomes than TAU individual treatment of couples. Combining correlational results with clients' feedback, we present a few key observations.

CCT improvements are more strongly correlated with each other than in TAU

In CCT, the improvements of the nine variables are more strongly and frequently associated with each other than in TAU. This network of improvements is likely reflective of CCT's

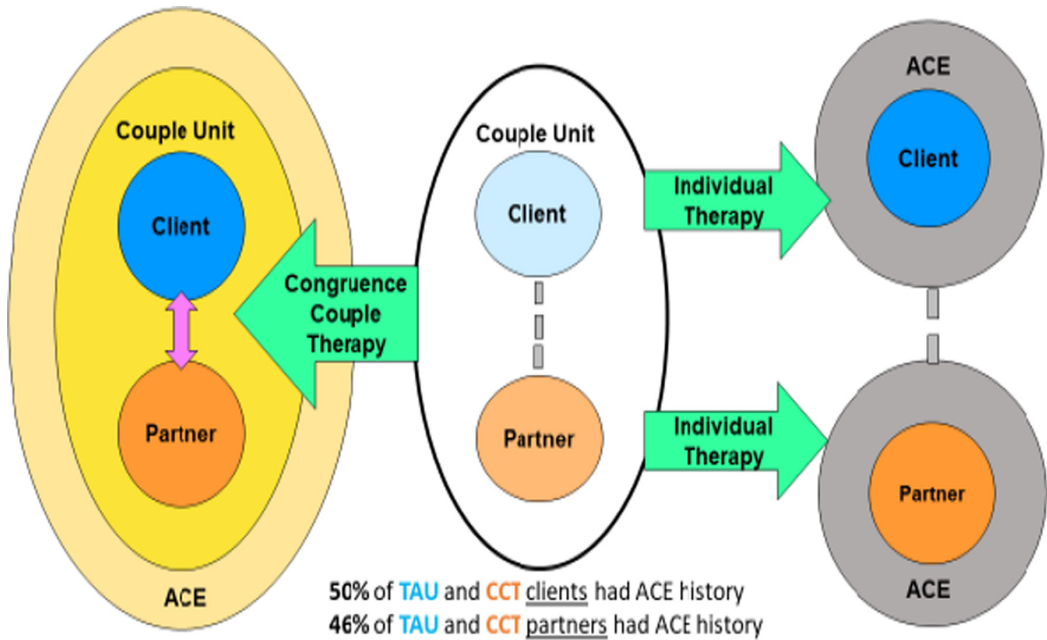


FIGURE 4 Contrasting CCT systemic and TAU individual-based interventions

four-dimensional interventions working with both members of a couple as a systemic unit to produce integrated changes as opposed to TAU's atomistic approach (Figures 1 and 4).

ER is an important mediator of therapeutic change

Improved ER has important mediating effects for improved alcohol use, other substance use, depression and psychiatric outcomes in CCT. ER also has mediating effects for psychiatric and depression improvement in TAU. ER's more numerous mediating effects on multiple outcomes in CCT is an important differentiating factor from TAU.

A rapidly growing body of literature discusses the centrality of ER in the development and maintenance of a range of psychopathology in cross-sectional studies (Cludius et al., 2020; Dvir et al., 2014; Sloan et al., 2017), including GD (Buen & Flack, 2021; Rogier et al., 2020), and AUD (Jakubczyk et al., 2018). Changes in maladaptive ER strategies were found to parallel the decrease in symptoms of psychopathology, including anxiety, depression, and substance use (Sloan et al., 2017). The mediating effects of ER in reducing addiction and psychiatric symptoms in CCT is worthy of note and calls attention to how couple therapy can improve ER.

Emotion regulation and couple adjustment

ER and couple adjustment improvements are significantly correlated in CCT. This is not the case in TAU. However, ER and couple adjustment do not directly mediate each other's improvement. This suggests the operation of potential intermediate variables between ER and couple adjustment. Given that congruent communication is a core construct within the four dimensions of CCT, and a target area highlighted by CCT participants, congruent communication could be the missing piece of the puzzle in the correlated improvements in ER and couple adjustment that should be explored in future studies.

Current training to improve ER has largely relied on individual psycho-education, cognitive-behavioral therapy, and mindfulness practice (Dvorak et al., 2014; Jakubczyk et al., 2018), but the role of the interpersonal context has been overlooked. Communication and the socially acceptable expression of emotion as a component of ER is still a nascent area of inquiry. Couple partners have been found to co-regulate each other's emotions (Butler & Randall, 2013) but the mechanism is unclear. Only recently, an interpersonal theory of ER has emerged to recognize that relational experiences can foster soothing, comforting, and security (Dingle et al., 2018). The relationship among improved ER, couple adjustment, and congruent communication would be an important area for future research with implications for couple therapy in reducing addiction and mental health distress.

Addiction and psychiatric symptoms

An ongoing question regarding the high comorbidity of addiction and psychiatric symptoms is the directionality of this association (Castillo-Carniglia et al., 2019). Research on the temporal sequence of comorbidities tend to indicate that psychopathology more often precedes the development of substance use disorders (Najt et al., 2011). For instance, depression has been found to be a predictor of gambling severity (Hounslow et al., 2011) and the development of future gambling problems (Hronisa et al., 2021).

The results of our partial correlation analysis reveal the mediating effects of improved psychiatric symptoms on reduced substance use, but not the converse. Our findings also indicate that depression has strong correlations with the process variables of ER and couple adjustment. These results suggest the more direct relationship of process outcomes with psychiatric improvements but less directly with addiction improvements. Future studies are needed for elucidation of the directionality and mechanism of interaction between addiction and psychiatric symptoms.

Adverse childhood experience (ACE) addressed in CCT

All ACE types and their levels of severity have been extensively documented as predictors of addictive disorders (Felitti et al., 1998; Fuller-Thomson et al., 2016). Our baseline data revealed that clients (50%) and partners (46%) have equivalent reports of ACE history, hence both members of the couple would require attention. CCT participants reported receiving help with their childhood trauma and abuse issues (intergenerational) but this was only minimally touched upon by TAU participants. ACE in both couple members is addressed within the couple reciprocal dynamic in CCT through congruence, that aids in improved ER and couple adjustment, thereby contributing to an integrated understanding of their own addiction, as reported by CCT couples.

Life stress and reduced comorbid symptoms

Lastly, an important RCT outcome is reduction in life stress. In the CCT correlations, the reduction in life stress is associated with five other change outcomes, including improved ER, couple adjustment, substance use and psychiatric symptoms. Stress reduction is associated with only two outcomes in TAU. Triangulating with participants' feedback, improved couple functioning and ER likely provided an environment of decreased stress conducive to reduction of addiction and comorbid symptoms. While stress level is significantly reduced in both CCT and TAU, it evidenced a significantly greater reduction in CCT (Lee et al., 2022). People who

have been exposed to adverse childhood experience were shown to have a lower ability to cope with stress across the life span (Milivojevic & Sinha, 2018; Sinha, 2001).

Exposure to chronic stress increases vulnerability to addiction, linked to increased addiction severity and poorer treatment outcomes, hence stress is recognized as “the single most powerful and reliable trigger of craving and relapse” (Ruisoto & Contador, 2019, p. 64). Coping with stress is put forth as an important target in addiction and mental health interventions (Buchanan et al., 2020). CCT in its couple-based systemic approach is significantly more effective than TAU in reducing life stress (Lee et al., 2022). Our correlational analysis found the reduction of life stress to be associated with a broad range of positive changes in CCT not found in TAU. Hence attention needs to be given to how systemic couple interventions can alleviate life stress for better addiction and mental health outcome.

Triangulation with treatment targeted areas and qualitative feedback

Triangulating participants' feedback increases the validity of our interpretation of the change mechanisms. CCT participants referenced increased “awareness” and “understanding” of self, partner, family of origin, and emotions, corroborating with findings in previous CCT studies (Lee & Awosoga, 2015; Lee & Rovers, 2008). Notably, “understanding” of their addiction issues holistically was emphasized by CCT participants.

Areas of communication, relationship, family of origin, spirituality, trauma, and abuse are targeted areas reported by participants in CCT, all part and parcel of CCT's four therapeutic dimensions (Lee, 2009). These areas are significantly less targeted by reports of TAU participants. Participants' feedback of their experience with the four dimensions of CCT's integrated and systemic targeted interventions vs lower proportions of TAU reports on these same areas (Figures 1 and 4) correspond to the stronger aggregate correlation coefficient found in CCT and CCT's higher mediational correlational effects.

CONCLUSION AND LIMITATIONS

Addictive disorders are complex and are associated with a constellation of factors. Deciphering the mechanism of an intervention that produces change is therefore not simple. We learned in this analysis that improvements in ER and couple adjustment are significantly correlated in CCT but not in TAU. Further, in CCT, ER improvement has multiple mediating effects on psychiatric improvements and addiction, surpassing those found in individual-based TAU.

Stress reduction as a contextual variable is more broadly associated with other improvements in CCT than in TAU. Trial results showed significantly greater within and between-group improvement in couple adjustment in CCT. Couple adjustment entails work on communication, family of origin, and trauma and abuse issues, targeted areas endorsed by CCT clients that clearly differentiate it from TAU. In turn, improved ER, associated with improved couple adjustment in CCT, suggests itself as a central mediator of improvements in a set of addiction and psychiatric clinical outcomes.

Notwithstanding these suggestive findings, results of the current mechanism study should be considered within its limitations and regarded as preliminary. Partial correlation has limitations in testing mediation such as its lower analytic power (Mackinnon et al., 2002). Larger samples and more advanced modelling would allow for testing of multi-level interactions among outcome variables, offering potentially more profound and robust analysis regarding causal mechanisms.

Another significant limitation was the lack of a validated measure of congruent communication that prevents us from assessing its possible mediating role to account for the

emotion regulation and couple adjustment correlation. Measuring congruent communication could be crucial for determining the mechanism of change in CCT and its relationship to ER, a central variable that is associated with improved mental health symptoms, life stress and couple adjustment in CCT as found in this study.

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