Linking process to outcome in Functional Analytic Psychotherapy: Evaluating the behavioral mechanism of change of a process-based therapy

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ABSTRACT

Process-based therapy has received attention in recent years and seeks to advance our understanding of mechanisms of change in behavioral health interventions. A process-to-outcome research approach was employed to examine the mechanism of change and treatment effects of Functional Analytic Psychotherapy (FAP). A non-concurrent multiple baseline design was conducted with three clients who endorsed psychological distress and interpersonal difficulties. FAP’s mechanism of change was tested with a lag sequential analysis. Statistical analysis for single-case designs was performed to assess between and within-participant treatment outcomes. High contingent and consistent reinforcement were associated with clinical changes in treatment outcomes. Therapeutic relationship factors such as therapeutic alliance and therapeutic relationship intimacy did not show moderation effects on treatment variables. Limitations and recommendations for improving reliability are discussed. The relations of treatment outcomes and FAP implementation are summarized. Finally, we discuss the relevance of process-to-outcome research for improving clinical science.

Data accessibility statement

Raw data and recruitment information are available at the Open Science Framework (OSF) and can be retrieved from: https://osf.io/zw26b/?view_only=4568392bd9f04991a807c8d85231bc4.

Process-based research linking behavioral principles such as reinforcement, discrimination, and rule-following to outcomes in typical clinical settings is almost nonexistent. A behavioral process-based approach assumes that psychological problems are under the control of mechanisms that can be directly influenced in therapy to produce treatment outcomes (Rosen & Davison, 2003). Research in basic processes in behavioral interventions can provide therapists with strategies to directly modify behavior in contexts that control psychological problems. For such endeavors to prove useful, functionally based targets and treatments need to be specified (Hayes et al., 2019; Hayes et al., 2021; Hofmann & Hayes, 2019; Tolin et al., 2015).

Maitland and Gaynor (2012) suggest that interpersonal difficulties are functionally related to a variety of psychological problems. The interdependence between individuals’ behavior and their social environment (the functional relation) is likely fundamentally important to the inception or maintenance of psychological problems. For instance, problems that have been usually categorized as mood, anxiety, and personality disorders within the syndromal based literature can be understood either as: (a) difficulties in obtaining valued social reinforcers, (b) excesses maintained by social consequences or, (c) avoidance of social contexts (Callaghan, 1996; Follette et al., 2000). Multiple contingencies of reinforcement maintain different clusters of functional classes of behavior, regardless of the response topography. Thus, assessing functional processes instead of counting symptoms or signs of interpersonal difficulties would be critical to determine the therapeutic procedures to be implemented for problems within the interpersonal difficulties’ domain.

Regarding the mechanisms of change in behavioral interventions, a behavioral process that has been thoroughly investigated is, of course, reinforcement, which implies that the probability of occurrence of the behavior is determined by its consequences (Ferster & Skinner, 1957). A strong body of evidence has demonstrated the effectiveness of behavioral analytic interventions that modify contingencies of reinforcement. These have mostly performed with children, people presenting with developmental and/or intellectual disabilities, individuals who live in
institutional treatment settings, and medication development and management (see Journal of Experimental Behavior Analysis, Journal of Applied Behavior Analysis, and Behavior Analysis in Practice). In addition, research has shown that interventions based on functional analyses can produce strong treatment outcomes in humans (Hurl, Wightman et al., 2016).

Functional Analytic Psychotherapy (FAP; Kohlenberg & Tsai, 1991) is a behavioral principle-based intervention in which therapeutic change is produced by therapists’ contingent responding to clients’ behaviors in-session (Therapist Effective Responding to Clinically Relevant Behaviors; TCRB) in the context of a meaningful (intimate) therapeutic relationship. As an intervention based on behavioral principles, FAP states that contingent reinforcement is the mechanism of change that should be leveraged to produce treatment outcomes both within and outside of the clinical setting (Kohlenberg & Tsai, 1991). FAP proposes that people’s interpersonal repertoires are emitted in session because therapists are members of clients’ verbal community and therapists’ behaviors may have functions similar to other individuals within the clients’ environment. That is, they are part of the same functional class, and as such therapists are able to positively reinforce functional interpersonal behaviors (Improved Clinically Relevant Behaviors; CRB2s) and introduce differential reinforcement procedures to reduce problematic interpersonal behaviors (Problematic Clinically Relevant Behaviors; CRB1s) while present discriminative stimulus (schedule of reinforcement program reset) that provides an opportunity for a CRB2 or other non-problematic behaviors. Differential reinforcement involves a complex schedule of reinforcement that usually combines extinction or punishment with reinforcement of alternative (DRA), incompatible (DRI), or no problem behaviors (DRO; Jesse; Bororro, & Becraft, 2015; Vollmer, Peters, Kronfl, Lloveras, & Ibañez, 2020). The ongoing implementation of reinforcement procedures constitutes novel contingencies of reinforcement that lead to clients’ improvements and generalization outside of session due to its functional equivalence with other clients’ settings (Kohlenberg & Tsai, 1991). A functional class refers to a group of behavioral responses that may have different topographies but have the same function or effect in the environment (Follette et al., 2000).

Recalling that process-outcome research refers to the application of a principle to a change in behavior, Functional Analytic Psychotherapy (FAP) has promoted process-outcome research to identify its mechanisms of change in typical clinical settings. FAP research has examined the effects of social reinforcement (delivered by therapists in session) with clients who present with mood and emotional problems (Espiraza Lizarazo et al., 2015; Landes et al., 2013; Villas-Bôas et al., 2016). Those studies have shown that FAP is useful in increasing effective interpersonal behaviors in and out of session (Kanter et al., 2017; Singh & O’Brien, 2017). Some experimental single-case designs have conducted lag sequential analyses to identify whether conditional (contingent) relationships between therapists’ and clients’ behaviors were responsible for clients’ improvements. For instance, Callaghan et al. (2003) conducted a FAP standalone intervention with a client presenting behaviors associated with histrionic and narcissistic behaviors. They found that therapist increased contingent responses over treatment and presented more effective responses towards clients’ CRB2s than CRB1s. Although this study provided promising results on putative FAP mechanisms of change, they did not link contingencies of reinforcement to treatment outcomes out-of-session or presented how contingencies evolved over long-lasting treatment sessions. In another study, Bush et al. (2009) examined the contingent relation between CRBs and therapist’s response using an A/A + B design, in which A represented CBT and B involved CBT + FAP. Although data analysis showed that introducing CBT + FAP increased therapists’ focus on therapeutic relationship, contingent responding towards CRBs was lower than 50% during FAP, which might be related to CRBs high variability and only observable changes on CRB2’s level in that phase. In addition, this study combined FAP and CBT, making it difficult to determine FAP-alone effects. While these preliminary process-outcome studies using FAP have provided information on likely mechanisms of change, there is little to no data to fill the process-to-outcome gap, which is necessary to link therapeutic procedures, mechanisms of change, and outcomes.

The need to investigate this process-to-outcome gap is especially important as clinical psychological science begins to pivot in a more idiographic and process-driven direction (Hayes et al., 2019; Hofmann & Hayes, 2019; Wright & Woods, 2020). It is not only imperative that our study of psychological interventions move beyond protocols and towards processes, but it is also important that we situate the unique individual at the center of our analyses (Hayes et al., 2019). Developments in statistical theory have demonstrated that the so-called ergodic theorem, that the structure of between-individual variation in data is substitutable for within-person variation, is frequently violated or otherwise not applicable to events in applied psychology (Molenberghs, 2004). Populations of scores at the group level are not suitable for modeling how any one person’s data change over time. Our assessment and data analysis methods need to take this into account, and position clinical research efforts to generate data that is meaningful in a person-specific way (Molenberghs, 2013).

The present study sought to explore the mechanism of change of FAP by examining the conditional relationship between therapeutic actions (i.e., differential reinforcement) and outcomes (i.e., interpersonal problems and goals, psychological distress). This translational study is an early step in a research program that focuses on behavioral intervention linked to mechanisms of change with the aim of reducing the burden of psychotherapy training and dissemination.

1. Method

1.1. Participants and power analysis

Participants were recruited and enrolled based on a prospective power analysis procedure for single-case designs developed through the SPSS D POWER macro (Marso & Shadish, 2014). Following Shadish et al. (2014) recommendations, conservative intraclass correlations and autocorrelations (\( \rho = 0.5 \) and \( \Phi = 0.5 \)) were employed. Effect sizes utilized to calculate power analysis were based on results from a pilot case, and an \( \alpha = 0.05 \) was utilized by convention. To obtain a high power (0.84), a sample consisting of three participants observed up to 15 sessions was required.

Sixteen potential participants were recruited by public advertisement and third party (or snowball sampling) contact. Eight participants were enrolled after eligibility screening and asked to consent to research participation according to APA and local IRB standards (see contact, screening, and retention flowchart; Appendix A). Eligible participants reported interpersonal relating difficulties assessed by the Functional Idiographic Assessment Template-Questionnaire-Short Form (FIAT-QSF; Darrow et al., 2014) and the FIAT manual (Callaghan, 2006). They also endorsed high levels of psychological distress measured by the Depression Anxiety Stress Scales (DASS; Lovibond & Lovibond, 1995). Exclusion criteria, which consisted of concurrent psychotherapy, current substance abuse disorder, current suicidal plan, past suicidal attempts, or history of psychotic or bipolar disorder, were assessed in the eligibility interview.

Six participants were initially enrolled (first enrollment). Participant dropout led to us conducting a second recruitment and enrollment process, and they were not related to the active treatment phase or worsening outcomes (Appendix A). All participants self-identified as female and heterosexual. Anya was a 20-years-old white college student, Sansa was 23-years-old Latinx student, and Catelyn was a 49-years-old white married woman who had a college degree (pseudonyms). Participants’ case formulation was organized in a clinical behavioral case conceptualization template (Novoa-Gómez et al., 2020), which synthesized an idiographic and indirect functional analysis of participants’ problems with their therapeutic goals (Appendix B).
1.2. Measures

The Functional Analytic Psychotherapy Rating Scale (FAPRS; Callaghan et al., 2008), an observational coding system based on FAP principles, was utilized to rate therapists and clients’ behaviors in session and treatment integrity. While all codes within the FAPRS were utilized when rating sessions, to analyze the hypotheses regarding the causal path between therapeutic actions and clients’ responses in-session, we focused on the following codes: (a) Clinically Relevant Behavior 1 (CRB1), (b) Clinically Relevant Behavior 2 (CRB2), (c) Therapist responds effectively to CRB1 (TCRB1; administering differential reinforcement by blocking or punishing CRB1s and presenting a discriminative stimulus for CRB2s), and (d) Therapist responds effectively to CRB2 (TCRB2; providing positive social reinforcement). Sessions were coded using Noldus Observer XT 11, a computer program designed to code video-recorded behaviors for establishing reliability. Noldus displays a confusion matrix, which is a combination of agreements vs disagreements and includes a window error for every code introduced. Based on this, Noldus calculated a reliability algorithm of kappa that combined observation pairs, generating a minimum, maximum, and average Kappa for all codes introduced.

Psychological distress and interpersonal functioning were measured by the Depression Anxiety Stress Scale (DASS; Lovibond & Lovibond, 1995) and the Functional Idiographic Assessment Template-Questionnaire Short Form (FIAT-Q-SF; Darrow et al., 2014). The DASS is a 42-item self-report scale rated on a 4-point Likert rating scale (0 = did not apply to me at all and 3 = Applied to me very much). The DASS is comprised by three subscales and a total score that is characterized as highly reliable with Cronbach’s alpha: depression $\alpha = 0.95$, anxiety $\alpha = 0.89$, stress $\alpha = 0.93$, and total score $\alpha = 0.97$ (Crawford & Henry, 2003). Crawford and Henry (2003) indicate cut-off point for (a) normal (0–78 percentile), (b) mild (78–87 percentile), (c) moderate (87–95 percentile), (d) severe (95–98 percentile), and (e) extremely severe (98–100 percentile) DASS scores.

The FIAT-Q-SF is a 32-items self-report on a 6-point rating scale (originally published as –3 to +3), and it is composed by six factors that have moderate to good reliability using Cronbach’s alpha: (a) avoidance of interpersonal intimacy ($\alpha = 0.82$), (b) argumentativeness or disagreement ($\alpha = 0.74$), (c) connection and reciprocity ($\alpha = 0.64$), (d) conflict aversion ($\alpha = 0.72$), (e) emotional expression and experience ($\alpha = 0.75$), and (f) excessive expressivity ($\alpha = 0.77$). The FIAT-Q-SF provided an ongoing measure of interpersonal functioning across research phases.

Therapeutic relationship variables were evaluated using the Working Alliance Inventory-Short Revised (WAI-SR; Hatcher & Gillaspy, 2006) and the Functional Analytic Psychotherapy Intimacy Scale (FAPIS; Leonard et al., 2014). The WAI-SR is a 12-items self-report inventory on a 5-point scale (5 = always and 1 = seldom) which assesses therapist and client’s perspective regarding the therapeutic relationship. The WAI-SR fits a model with a three-factor structure that have been found to be reliable using Cronbach’s alpha: Goals $\alpha = 0.87$, Tasks $\alpha = 0.85$, Bond $\alpha = 0.80$, and total score $\alpha = 0.91$. The FAPIS is a 14-item scale scored on a 7-point Likert scale (0 = not at all and 6 = completely). This instrument assesses intimacy-related behaviors regarding particular people (used in this study to evaluate clients’ level of intimacy towards their therapists). The FAPIS evaluates three main components of intimacy that have demonstrated good to excellent internal consistency using Cronbach’s alpha: Hidden Thoughts and Feelings $\alpha = 0.86$, Expression of Positive Emotions $\alpha = 0.93$, Honesty and Genuineness $\alpha = 0.92$, and sum score $\alpha = 0.91$.

1.3. Procedure and design

A non-concurrent multiple baseline design (MBL) across three participants with a follow-up phase was conducted (A/B/F-UP). Baseline (A; BL) lengths were randomly assigned across participants (3, 5, and 6 weeks). During BL, we utilized the Supportive Listening protocol developed by Maitland and Gaynor (2016). SL has been widely implemented as a control condition in randomized control trials to compare conditions (Cuijpers et al., 2012). In this phase, therapists mirrored clients’ experiences and encouraged them to share emotions and feelings. Therapists were prohibited from giving advice, making interpretations, and providing feedback to clients. An evaluation of participants’ developmental, psychosocial, and sociocultural history was also performed during the baseline using a semi-structured interview.

The intervention phase (B; FAP) lasted nine sessions. At intervention, clinically relevant behaviors (CRBs) classified as problems (CRB1s) and improvements (CRB2s) were modified by therapists’ actions (TCRBs). FAP therapists evoke CRBs, provide differential reinforcement (TCRB1) with the aim of reducing CRB1s, and deliver positive reinforcement (TCRB2s) to strengthen CRB2s. In addition, FAP therapists encourage clients to generalize CRBs changes to outside of the therapeutic setting while discriminating contexts where those behaviors could be reinforced or punished (Kohlenberg & Tai, 1991).

In session 1 of the FAP phase, therapist and client discussed case conceptualization and alternative behaviors to improve interpersonal functioning. Participants were presented with the following three general assumptions for how FAP might produce change: (a) the therapeutic relationship is a real relationship, (b) therapists provide honest and genuine feedback to participants with the aim of achieving their therapeutic goals, and (c) the therapeutic relationship is a safe place to learn new and healthier ways to interact with others. Subsequent FAP sessions included therapists’ implementation of ERBs and TCRBs to produce therapeutic changes.

Finally, a follow-up session took place four weeks after completion of the intervention with the aim of assessing participants’ psychological distress and interpersonal functioning.

Therapists and Coders. Two clinical psychology doctoral students with clinical psychology master’s degrees and backgrounds in clinical behavior analysis conducted the intervention. Therapist-1 was a FAP certified trainer with five years of clinical experience after receiving her master’s degree in her country of origin, and three additional years of supervised experience at her doctoral program. Therapist-2 has five years of clinical supervised experience in his master’s and doctoral training programs. Throughout the study, therapists received 1-h weekly supervision by a Ph.D. level FAP supervisor. Although the FAPRS can measure treatment adherence, therapists’ competency was not assessed.

Therapeutic exchanges between therapist and client were time-stamped turn-by-turn by a research assistant. By doing so, coders were able to easily identify the time lag in which they had to assign a code. Two independent coders (who were blind to the study hypotheses) rated therapeutic sessions in random order after completing a one year and a half training (included readings in FAP and functional assessment) and passing a test of reliability with Cohen’s kappa of $\kappa = 0.75$ (see Appendix C for training description). One coder was a third-year clinical psychology doctoral student, and the other held bachelor’s degree in psychology. Participant’s case conceptualization and a description of global themes addressed in each therapeutic interaction were presented to coders before rating each therapy session. Each coder rated half of the study’s tapes, and also rated 30% of the other coder’s tapes for reliability.

Interrater reliability was calculated by Cohen’s kappa that compared codes from different raters at the same time lag. A moderate level of reliability among coders according to Cohen’s kappa which varied within participants ranging between 0.31 and 0.74 for Arya, 0.48 and 0.59 for Sansa, and 0.34 and 0.74 for Catelyn.

1.4. Data analysis and hypothesis testing

To examine the mechanisms of change of FAP, a state-based lag sequential analysis was conducted, which summarizes interactions...
between behaviors of different individuals with the aim of identifying whether behavioral sequences are cross-dependent. FAPRS’ codes were introduced into O’Connor’s (1999) sequential-group (SEQGROUPS) syntax in SPSS to analyze lag-sequential data.

Behavioral sequences were summarized in probability transitional matrices. These present the probability with which the therapist responded contingently given the client emitted a clinically relevant behavior. This study analyzed the probability with which CRB1s preceded TCRB1s at time 1 (P (TCRB1|CRB1)), and the probability with which CRB2s predicted TCRB2s at time 1 (P (TCRB2|CRB2)). Chi-square (χ²) was performed in an individual lag level to establish whether interdependence (cross-dependence) within the transitional frequency matrices was significant. This analysis provides information on whether the occurrence of behaviors significantly depends on the occurrence of other responses. Within this study, it evaluated whether therapists’ effective responses (TCRBs) were likely preceded by clients’ clinically relevant behaviors.

Statistical significance of transitional probabilities was calculated by computing p-values. Yule’s Q statistic was used to evaluate the strength of the sequential association between clients’ and therapists’ behaviors from −1 to +1 (O’Connor, 1999). Rosenthal (1996) established the following benchmarks for interpreting Yule’s Q effect sizes: small (0.23), moderate (0.43), and large (0.60).

A visual inspection to compare trends between- and within-subjects was conducted to observe FAP effects on psychological distress and interpersonal functioning (Manolov & Moeyaert, 2017). Pustejovsky’s (2016) web-calculator was employed to analyze between-case standardized mean difference (BC-SMD; Hedges et al., 2012). The BC-SMD maintains the metric and interpretation standards of Cohen’s d statistic: small effects (0.2–0.49), medium effects (0.5–0.79), and large effects (0.8–above). A non-overlap analysis of all pairs (NAP; Parker & Vannest, 2009) was also performed as a complementary within-case effect size assessment. The percent of non-overlapping data provides an effect size indicator by comparing whether data drawn at random from the baseline exceeds data in treatment. Pustejovsky and Swan’s (2018) web calculator was utilized to compute NAP index. Simulation Modeling Analysis (SIMA) was conducted to test the relation between treatment and outcome variables based on the estimated autocorrelation and data length in thousands (~5000) of simulated samples using bootstrapping. SIMA is an alternative statistical technique that controls for Type-I and Type-II errors when analyzing short streams of autocorrelated data that are typically observed in single-case designs (Borckardt & Nash, 2014). Results provide a Pearson’s r and its critical alpha which indicate the correlation between the IV and the DV after simulating data streams.

2. Results

Results are presented in three main sections. Section one presents the evaluation of FAP’s mechanism of change through the lag-sequential analysis of transitional probabilities of TCRB1s given CRB1s and TCRB2s given CRB2s. Section two contains analyses of FAP effects on psychological distress and interpersonal difficulties by comparing between- and within-participants frequency polygons, BC-SMD, SMA, and NAP. Finally, section three evaluates whether therapeutic alliance and intimacy in the therapeutic relationship moderated clinical outcomes.

2.1. Analyses of mechanism of change: lag-sequential analyses

Client and therapist behaviors in-session were examined at a Lag 1, evaluating the probability with which the antecedent event (CRB) predicted the subsequent event (TCRB). Percentage of transitional probabilities is presented in histograms. Polygons of frequency/scores of outcome variables (CRBs frequencies, DASS, and FIAT-Q-SF) are compared to transitional probabilities histograms to examine the relation of contingent responding and clinical outcomes. DASS and FIAT-Q-SF were administrated before starting the therapy session, therefore, X-axes of these measurements start at S0 (session zero) for all participants. The analysis of the mechanism of change of FAP per each participant is described below.

Arya. All of Arya’s sessions showed cross-dependence among transitional frequency matrices, indicating a significant interdependence among therapist and participant’s behaviors throughout research phases (Table 1).

Visual inspection of transitional probabilities indicated a low level of contingent responding to CRB1s in BL (Fig. 1). A significant increase in the probability of occurrence of TCRB1s, given CRB1s were observed within the FAP condition (between 50% and 100% of times). In four of the nine FAP sessions, the therapist responded contingently 100% of the times to CRB1s. Yule’s Q indicates that the magnitude of contingent responding in most sessions was significantly large (Appendix D).

Contingent responding to CRB1s by the therapist on outcome variables was significantly associated with a reduction in CRB1s, psychological distress, and interpersonal difficulties (Fig. 1). For instance, DASS scores significantly decreased when the therapist contingently responded (above 88% of times). Similarly, FIAT-Q-SF scores lessened (improved) as a result of the contingent implementation of TCRB1s. CRB1s took more time to decrease than DASS and FIAT-Q-SF scores. However, after a highly contingent session (S6) in the FAP phase, CRB1s were significantly reduced and maintained a lower frequency in most sessions until the end of the intervention.

The probability of TCRB2s, given CRB2s, ranged between 31% and 78%, and contingently responding above 50% were observed in five out of nine FAP sessions (Fig. 1). The magnitude of the sequential association between CRB2s and TCRB2s was large for ten of the twelve therapy sessions (Table 1). However, the likelihood of occurrence of contingent responding to CRB2s is also less than contingent responding to CRB1s at intervention. In Arya’s case, outcomes showed that the therapist only responded with positive reinforcement 50% of times a CRB2 occurred. This may be related to the change in the schedule of reinforcement from negative to differential reinforcement. Since Arya used to respond with CCR1s controlled by negative reinforcement in situations of intimacy, demands, and conflict, FAP introduction implied hinder opportunities to escape in-session, putting more attention to CRB1s than CRB2s. This may account for why CRB2s did not vary significantly throughout this phase.

Arya’s outcomes showed a reduction in clinical problems such as psychological distress and interpersonal dysfunction in and out of session. It is likely a higher rate of contingent responding to CRB1s within the FAP phase produced significant clinical change. The small proportion of contingent administration of positive reinforcement hinders the possibility to establish how low TCRB2s affected out of session clinical outcomes (DASS and FIAT-Q-SF scores).

Sansa. Most transitional frequency matrices were significantly cross-dependent (Table 1). However, no significant interdependence between therapist’s and Sansa’s behaviors was found in session-2 (χ²(121) = 121.17, p = 0.47) and session-6 (χ²(121) = 133.9, p = 0.198); therefore, results of transitional probabilities from these sessions could not be interpreted.

Within BL, therapist did not present TCRB1s, indicating compliance with the control condition instructions. Transitional probabilities indicated a low level of contingent responding to CRB1s, in which the majority of the sessions the P (TCRB1|CRB1) was under 30%. CRB1s displayed an interesting pattern. When the therapist introduced TCRB1s at S8, CRB1s increased in level substantially, which we hypothesize may represent an extinction burst. Analyzing the effects of increasing TCRB1s, a reduction in CRB1s and DASS scores was observed. Indeed, CRB1s and psychological distress decreased from S10 to S12 when the percentage of contingent responding improved. These results may exemplify the positive effects of evoking and contingently responding to problematic behaviors in sessions to reduce problems outside of session (Fig. 2).
Table 1
Interdependence of transitional frequency matrices between participants across sessions.

<table>
<thead>
<tr>
<th>Participant</th>
<th>Inter-dependence ($\chi^2$) by sessions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Arya</td>
<td>270.8* 149.3* 180.9* 217.4* 282.7* 326.7* 214.7* 190.3* 220* 442.9* 202.6* 168.7*</td>
</tr>
<tr>
<td>Sansa</td>
<td>155.9* 121.1 249* 176.4* 177.5* 133.9 219.7* 219.2* 256.8* 213* 232.1* 218.9* 179.5* 153.2*</td>
</tr>
<tr>
<td>Catelyn</td>
<td>178.5* 102.6 129 110.7 137.2 137 207.5* 216* 186.6* 259* 289.3* 179.5* 148.2* 180.5* 264.9*</td>
</tr>
</tbody>
</table>

*p < 0.05.

Fig. 1. Arya’s rate of contingent response (TCRBs, given CRBs; the left Y-axis) compared to clinical outcomes (the right Y-axis): frequency of clinically relevant behaviors (top), psychological distress scores (middle), and interpersonal difficulties scores (bottom).
Therapist’s contingent responding to CRB2s was less than 15% at BL. Percentage of probabilities of TCRB2s, given CRB2s at intervention, indicated a low administration of contingent positive reinforcement in most FAP sessions. This may explain the lack of interaction between treatment outcomes scores and contingent responding to CRB2s at intervention (Fig. 2). In general, the rate of contingent reinforcement was low and appears to have been inconsistently applied across Sansa’s FAP sessions.

Catelyn. Transitional frequencies were only significantly cross-dependent in S1 at BL. Therefore, the other five baseline sessions could not be analyzed. Instead, intervention transitional frequency matrices were significantly interdependent and appropriate to be interpreted according to parameters described in the procedure (Table 1).

TCRB1s and TCRB2s were not present at BL as expected. Although contingent responding to problems and improvements was introduced in the intervention, TCRB1s and TCRB2s were implemented less than 50% of the times CRB1s and CRB2s occurred. CRB2s showed a variable pattern that was unrelated to TCRB2s presentation in the intervention, and CRB1s presented a large amount of variability and instability, meaning TCRB1s and CRB1s were likely unrelated (Fig. 3).

The comparison of TCRBs’ proportions and contingent responding at Lag 1 with psychological distress and interpersonal difficulties measurements did not indicate an association between contingent responding and clinical outcomes (Fig. 3). Catelyn’s outcomes suggested that poor contingent responding to CRB1s and CRB2s hindered therapeutic changes in and out of session.

2.2. FAP and clinical outcomes outside of session

A between participants’ analysis was performed to examine FAP effects on psychological distress outside of session. A reduction in psychological distress scores was observed on Arya’s and Sansa’s, but these did not change for Catelyn after implementing FAP. The statistical test of
the following null hypothesis was performed based on a fixed-effect model: the average effect size of psychological stress and its scales was zero. The data lead us to reject that null hypothesis. After introducing FAP, treatment effects showed a significant reduction on global psychological distress ($\beta = 12.63$, S.E. = 0.40, $p = 0.005$) and Between-Case Standardized Mean Difference (BC-SMD) evidenced significant medium effect size (BC-SMD = -0.51, CI [-1.29 to -0.01]).

Within participant analyses indicated that Arya’s DASS global index had a positive change associated with FAP implementation. SMA based on level change confirmed a statistically significant reduction on clinical problems with large and moderate effect sizes in psychological distress ($r = 0.90$, $p = 0.00$; NAP = 1, CI95% [-1 to 1]). Contrary to Arya and Sansa, Catelyn’s psychological distress presented a high variability across research phases. Catelyn’s SMA did not find a significant relationship between treatment implementation and DASS ($r = 0.08$, $p = 0.82$).

The statistical test of the treatment effect of total FIAT-Q-SF ($\beta = 3.42$, S.E. = 5.81, $p = 0.559$) did not show a significant reduction after implementing FAP when conducted a between participants comparison. However, the within-participant analysis of interpersonal functioning showed distinct patterns across participants. While Arya’s interpersonal difficulties decreased significantly when introducing FAP ($r = 0.88$, $p = 0.01$), Sansa’s and Catelyn’s FIAT-Q-SF scores were not associated.

**Fig. 3.** Catelyn’s rate of contingent response (TCRBs, given CRBs; the left Y-axis) compared to clinical outcomes (the right Y-axis): frequency of clinically relevant behaviors (top), psychological distress scores (middle), and interpersonal difficulties scores (bottom).
with positive results during intervention.

2.3. Therapeutic relationship factors and clinical outcomes

Working alliance (WAI-SR) and therapeutic relationship intimacy (FAPIS) between participants had a positive association across research phases. Arya and Sansa reported high scores in therapeutic alliance at the end of BL, and when implementing FAP their scores were only a few points below the scale’s ceiling (60 points). Catelyn’s therapeutic alliance scores were lower than Arya and Sansa across the research process; however, Catelyn’s WAI-SR score (Baseline M = 39.16; Treatment M = 46.56) were above the average population (M = 5.88; Hatcher & Gil-lassy, 2006). A similar pattern was observed in therapeutic relationship intimacy scores across participants.

Independent patterns between clinical outcomes and therapeutic relationship measurements were observed. Arya’s psychological distress and interpersonal difficulties scores continued improving even though therapeutic alliance measurement reached the top of their rating. In session 10, FAPIS scores were negatively impacted; however, DASS and FIAT-Q-SF seemed not to be altered by such change. Sansa’s responses to WAI-SR and FAPIS rapidly reached their ceiling in the FAP phase; nonetheless, neither interpersonal difficulties scores nor did psychological distress vary as a result of the changes in therapeutic relationship measures. Catelyn’s therapeutic relationship measurements slightly improved from session 13, but they did not alter DASS and FIAT-Q-SF scores.

3. Discussion

The main assumption of Functional Analytic Psychotherapy is that clinical change is produced by the mechanism of contingent reinforcement (Kohlenberg & Tsai, 1991). The present study provides promising empirical evidence supporting this assumption. The sequential microanalysis of clients’ and therapists’ behaviors in session supported this hypothesis and allowed formulating potential explanations for why and how treatment outcomes occurred.

Higher rates of contingent reinforcement during the intervention phase compared to baseline supportive listening were found in a similar way to other FAP studies (e.g., Maitland & Gaynor, 2016). When FAP therapists responded to clients’ problems and improvements in accordance with established learning principles, a change in clinical outcomes was observed. Random assignment of therapeutic sessions to blind coders aided in controlling raters’ biases. This methodological control reduced the chances that observations of clinical changes were an artifact of the coding process.

Assessment of proximal and distal dependent variables (CRBs, psychological distress, and interpersonal difficulties) as well as potential moderators (i.e., therapeutic alliance) of the treatment-outcome relationship provided valuable information on FAP’s mechanism of change. This study found that steady contingent responding towards CRB1s was related to significant changes in clinical indicators, especially psychological distress. Arya’s case showed a substantial reduction in psychological distress when contingent differential reinforcement to CRB1s was presented consistently in FAP sessions (Fig. 1). Sansa’s distress decreased upon the introduction of contingent differential reinforcement. However, her interpersonal functioning did not change. This may be related to the inconsistency in the delivery of contingent differential reinforcement, only two of nine sessions presented high rates of P (TCRB1si|CRB1).

Although FIAT-Q-SF scores stabilized in level after increasing the contingent implementation of TCRB1s, the small amount of contingent responding to CRB1s and CRB2s may have prevented FAP from producing a meaningful change in Sansa’s interpersonal difficulties. Catelyn’s therapist delivered TCRB1s during all intervention sessions. However, contingent reinforcement occurred less than 50% of the times that CRB2s occurred, meaning contingent responding happened with a low probability in Catelyn’s sessions. The low rates of contingent reinforcement may relate to therapist level of training (she was seen by therapist 2), and future research would benefit from including therapists with higher levels of expertise. It is also important to mention that while competing schedules of reinforcement make exact interpretation difficult, this is the first study to provide parametric data on the density of therapist responding that would be needed to produce change.

The clear distinction between procedures and processes as well as the data analytic strategies used in this study were intended to address some of the problems typically seen when doing research that links process to outcome (Hofmann & Hayes, 2019). Methodologically, therapists’ therapeutic actions, contingencies of reinforcement, and outcome variables were distinguishable. Examination of therapist-client dyads using lag sequential analysis provided information about the causal link between FAP and clinical outcomes. Information on proximal dependent variables controlled for artifacts associated with long time intervals between therapeutic procedures and clinical outcomes (Boswell, 2015).

Behavioral momentum was another factor that likely favors treatment outcomes in this research. A greater momentum was observed in Arya’s case, in which FAP was characterized by an ongoing high level of reinforcement rate relative to participant’s CRBs, enhancing the chances of producing sustainable clinical changes. In contrast, Sansa’s and Catelyn’s contingencies of reinforcement were intermittent and lower in most sessions, interfering with behavioral momentum and enduring change. As Waltz and Follette (2009) state, some problematic behaviors persist even though rates of reinforcement for them are modified. Likely, Sansa’s and Catelyn’s low and inconsistent rates of contingent reinforcement (i.e., small behavioral momentum) hindered alternative behaviors chances of competing with participants’ history of reinforcement. Such difficulties may be related to the length of the intervention in this study. In the future, it would be valuable to evaluate FAP effects with a greater number of sessions that allow therapist to create a new contingencies’ history that would be strong enough to compete with clients’ problematic present and historical contingencies.

Statistical analyses tested FAP effects on interpersonal problems and psychological distress. BC-SMD analyses demonstrated significant medium effect sizes of FAP on psychological distress. The within-person statistical analyses were crucial to test the effects of contingent reinforcement quantitatively. While SMA for Arya confirmed a positive relationship between FAP and treatment outcomes, it did not detect a significant correlation in Sansa’s and Catelyn’s cases that may related to the low rates of contingent reinforcement in their cases. NAP analyses found significant strong effects only for reducing interpersonal problems in Arya while no effects were found for Catelyn that might be related to lower rates of contingent responding. It is possible that the lack of a relations between CRBs and TCRBs in Catelyn’s case could be the result of (a) client response style due to her long-standing difficulties to effectively communicate her emotions across contexts or (b) therapist low quality of reinforcers spurious or ineffective repertoires. Future research may want to explore ways to evaluate high quality and valuable reinforcers, and their effect on clients with long-standing difficulties, as well as ways of training FAP therapists on enhancing precision and good fit of reinforcers delivered in-session.

Changes in interpersonal difficulties occurred under conditions of high and consistent rates of contingent reinforcement. Shaping interpersonal behaviors such as emotional expression, needs assertion, conflicts resolution, bidirectional communication, and intimate disclosure (Callaghan, 2006) likely require that the therapist fine-tune specific repertoires in session. Therefore, low rates of contingent reinforcement were not enough to train alternative interpersonal repertoires. Improvements in interpersonal behaviors were only observed in one client; therefore, replications are needed to determine whether FAP is a valid intervention for social functioning.

Moderation effects of therapeutic relationship factors such as working alliance and intimate therapeutic relationship were not detected in this study. Some possible explanations for between-participants
differences may include scales ceiling effects and therapist effects. High scores on therapeutic alliance and intimacy at the first therapeutic interaction could be related to therapist features such as gender, age, marital status, etc., that matched participants’ preferences and may favor the therapeutic relationship. This also could explain why no changes were observed for Catelyn who differed on age, gender, and marital status from her therapist. As DeRubeis et al. (2005) mention, a good client-therapist match might predict client’s compliance better than therapeutic alliance. However, this is a post hoc interpretation and should be tested in the future to evaluate its plausibility.

4. Limitations and recommendations

Moderate levels of agreement on therapeutic sessions coding as indicated by Cohen’s kappa are a critical limitation of this study. The small number of codes of out-of-session behaviors as well as having coders that likely were fallible may introduce substantial bias to kappa analyses (Bakeman et al., 1997). Particularly, coders who had little or no clinical experience with FAP may have hindered reliability. Instead, the FAP studies that obtained better interrater reliability (Esparza Lizarazo et al., 2015; Villas-Boas et al., 2016) employed advanced doctoral students and licensed psychologists as coders. This lack of experience may have minimized any allegiance effects or observer bias but could have limited reliability. Alternatively, the difficulties establishing reliability with the FAPRS may indicate that coders had a difficult time discriminating when the therapist was responding contingently to clients. Thus, results associated with coding (i.e., contingent responding) should be interpreted with caution as they are only exploratory. Reliability may be improved in future studies by using more experienced coders trained in clinical behavior analysis, and particularly FAP.

Regarding FAP effects on interpersonal difficulties, participants showed different patterns. On the one hand, Arya’s FIAT scores were decreasing from baseline and were boosted when implementing FAP. On the other hand, some factors may explain the absence of effects on Catelyn and Sansa’s interpersonal functioning. For instance, it is possible that therapists’ lack of expertise led to lower density of reinforcement, and therefore, low contingent reinforcement as they were seen by Therapist-2. It is also possible that Catelyn’s and Sansa’s long-standing difficulties to effectively communicate her emotions across contexts affected her engagement in a novel interpersonal stance offered during the intervention. Shaping interpersonal behaviors such as emotional expression, needs assertion, conflicts resolution, and so forth (Callaghan, 2006) likely requires that the therapist focus on specific repertoires in session. Therefore, low rates of contingent reinforcement were not enough to train alternative interpersonal repertoires. Future research could remedy this issue and increase the rate of contingent responding of therapists by testing alternative approaches to training FAP, such as using pointers in-session or increasing hours of supervision.

Another limitation is related to final sample gender and sex identities. It is important to mention that all three were women which limits the generalization of our results. Future research should increase efforts to encourage the enrollment of a more diverse sample, to evaluate whether quality and density of reinforcement work in a similar way for individuals of varied backgrounds.

5. Conclusion

This empirical examination of the mechanism of change of FAP found that contingent reinforcement might be responsible for meaningful changes in psychological distress. These are promising results that should be replicated in future studies by controlling those factors that hinder reliability and conclusions on contingent reinforcement effects. This study offers the following process-to-outcome model of FAP: FAP procedures (intervention) —> High rates of contingent differential reinforcement (mechanism of change) - > Psychological distress and interpersonal functioning (outcomes). Though this is an exploratory study, it employed a diverse array of contemporary methods to study mechanisms of change in therapy beyond correlational analyses. These methods allowed us to combine within and between participant effects models. A call to investigate the clinical utility of process-based interventions has been sounded, and we believe that this study may be a useful proof-of-concept for how such research can be conducted in the future.

Declaration of competing interest

We wish to confirm that there are no known conflicts of interest associated with this publication and there has been no significant financial support for this work that could have influenced its outcome.

We confirm that the manuscript has been read and approved by all named authors and that there are no other persons who satisfied the criteria for authorship but are not listed. We further confirm that the order of authors listed in the manuscript has been approved by all of us.

We confirm that we have given due consideration to the protection of intellectual property associated with this work and that there are no impediments to publication, including the timing of publication, with respect to intellectual property. In so doing we confirm that we have followed the regulations of our institutions concerning intellectual property. We understand that the Corresponding Author is the sole contact for the Editorial process (including Editorial Manager and direct communications with the office). She is responsible for communicating with the other authors about progress, submissions of revisions and final approval of proofs. We confirm that we have provided a current, correct email address (amandamile@gmail.com) which is accessible by the Corresponding Author and which has been configured to accept email from the journal.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jcbs.2022.04.001.

References

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Rosen, G. M., & Davison, G. C. (2003). Psychology should list empirically supported principles of change (ESPs) and not credential trademarked therapies or other treatment packages. Behavior Modification, 27, 300-312.


