

Abstract

In order to increase therapeutic impact by enhancing awareness of clients' nonverbal communications, this article operationalizes the therapeutic alliance as a Needs-Satisfaction Process. The client's competence as a needs-seeker and the therapist assisting with the client's expression and satiation of basic social needs are proposed as being key mechanisms of change.

Functional model of primary emotions derived from Panksepp's seven primary emotional systems (care seeking, care-taking, lust, fear and anxiety, anger, play, seeking, plus dominance and disgust) is integrated with Functional Analytic Psychotherapy's emphasis on in-session contingent natural reinforcement of clients' target behaviors. By identifying in-the-moment cues of underlying emotional-behavioral functions drawn from a categorisation of clients' nonverbal communication, can bridge the gap between client private events and therapist observables, in order to maximize therapist attunement and responsiveness to clients, and to increase the effectiveness of clinical interventions.

Key Practitioner Points

- Enable clinicians to identify *intra-relational* primary emotional-behavioral nonverbal cues, and *inter-relational* Needs Satisfaction Process levels of functional clinically relevant behaviors within the therapeutic interaction.
- Increase awareness of how the dyadic process of needs-seeking, needs-recognition and needs-satisfaction can be used as a method of assessment, formulation and intervention.
- Apply intervention with complementary clinician primary emotional behavioral nonverbal responses to shape up adaptive client needs-satisfaction process skills.

Keywords:

Functional Analytic psychotherapy (FAP), Emotions, Nonverbal communication, clinically relevant behaviors, Needs-satisfaction Process, primary emotions

1.0 Introduction

An important concern of psychotherapy research is to ask process-led research questions that take into consideration the context and the function of the psychotherapeutic relationship. The individual variables of therapist, client and therapeutic protocol are important elements that have been examined yet understanding the process of how these variables interact to produce emergent qualities which leads to successful therapeutic treatment is still tenuous. Operationalising the relational function of psychotherapy can help to develop a relational process theory which underlies the proliferation of different psychological protocols and interventions.

The enquiry into key ingredients that make psychotherapy effective remains unresolved. Strupp (Strupp, 1973) observed 3 important conditions in all forms of psychotherapy: 1) the therapist maintains a helpful relationship that correlates with a caring, understanding and respectful parent-child attachment; 2) the therapist is able to influence the client with curious enquiries, encourage non-defensive and self-compassionate reflection, act as a role-model and reinforce effective responses; 3) the client has the capacity and willingness to be open and honest and to receive the help.

Strupp (1973) criticised the therapeutic communities' lack of acknowledgement of "the therapeutic situation as a power base for psychological influence", since the focus of treatment is frequently placed on resolving transference issues or in behavioral approaches, un-coupling conditioned learning with new learning networks.

The relationship between therapists' direct influence skills (how the therapist can influence a change of behavior from the client) by modelling new behaviors and reinforce new learning, to treatment outcome are under-researched. Are therapist influence and interpersonal skills an inverse relationship or bilateral? Is this an important part of successful treatment? Perhaps it leads to willingness to participate in treatment, or perhaps it is not necessary at all?

The last significant review on nonverbal events (NVE) in psychotherapy and how this influenced client change was by Wiener et al. (see definition of NVE in the review: Wiener, Budney, Wood, & Russell, 1989), which highlighted a lack of homogeneity in the operationalisation of nonverbal variables and external and ecological validity, and concluded the contribution to clinical practice from these studies were negligible. Our review of current studies associating nonverbal events with therapy outcome still suffers from issues of

theoretical and methodological heterogeneity in how to define functions of NVE in psychotherapy.

A weak association between therapist interpersonal skills and outcome than originally predicted has been found in reviews (Gurman, 1977; Mitchell, Bozarth, & Krauft, 1977; Patterson, 1984). Efforts to understand this association have been hampered by a lack of consistency in how relationship factors have been measured across studies. The lack of a coherent model of therapeutic process with consistent and relevant measures of relational variables has been an obstacle to process research.

Lambert and Barley (Lambert & Barley, 2001) noted that common process factors (i.e. relationship variables) reportedly account for 30% of the variance in adult treatment outcomes, above and beyond the 15% of variance accounted for by specific therapeutic techniques. Meta-analyses have demonstrated that the therapeutic alliance is the most robust predictor of treatment outcomes for both adult and youth clients (Horvath & Symonds, 1991; Martin, Garske, & Davis, 2000; Murphy & Hutton, 2018; Shirk & Karver, 2003), although Safran and Muran (2006) argued that these reviews garnered modest correlations of approximately 6% of the outcome variance. Therapist allegiance effects seem to account for much more of the outcome variance, up to 10% (Robinson, Berman, & Neimeyer, 1990).

Discrepancies in how therapeutic alliance is operationalised and measured may have inadvertently obscured understanding of their impact on outcome. A combination of descriptions for alliance has been suggested in literature: an emotional connection that has been labelled as affective attachment, affective bond, affective experience of the client (Fosha, 2001; Schore, 2000); client's perception of therapist's affect, empathy, trust, and comfort (Nienhuis et al., 2016). Sometimes it has been additionally defined as a cognitive connection (e.g., agreement on goals; (Bordin, 1979) and behaviorally described as a process of mutual shaping and learning (Follette, Naugle, & Callaghan, 1996; Lejuez, Hopko, Levine, Gholkar, & Collins, 2005). It can be referred to as collaboration on therapeutic tasks, negativity toward the therapist/client, client openness/ therapist disclosure, and involvement in developing a treatment plan (S. J. Ackerman & Hilsenroth, 2001; 2003; Horvath, 2017; Keijsers, Schaap, & Hoogduin, 2000; Safran & Muran, 2006). Some proposed variables appear to be separate constructs that occur at different points in the therapy process yet are all being included simultaneously in general alliance and relationship measures. It is possible that three separate constructs (emotional connection, cognitive connection, and behavioral

participation) may occur at different points during treatment. Forcing these constructs together into general measures may be resulting in loss of information about the process of therapy and does not answer how to effectively operationalise “the therapeutic alliance” into testable units of interactional behavior.

There is a promising movement in psychotherapy research towards operationalising nonverbal affective variables within therapeutic interactions. A review of nonverbal variables in psychotherapy and effects on outcome indicates a wide range of factors being considered, including: motion energy analysis of synchronised eye and body movements (Ramseyer & Tschacher, 2011; 2014), measures of facial expressions such as the Facial action coding systems (FACS; Ekman, 1978); Frequency and function of nonverbal expressions, body formation (de Roten, Darwish, & Stern, 1999), and vocal pitch synchrony (Reich, Berman, Dale, & Levitt, 2014). Correlating nonverbal variables to outcomes were often analysed post-hoc without clear indication of the function contingent to the interaction. Consequently, it is difficult for the clinician to generalise and extract the therapeutic functions of these nonverbal interactions that can benefit treatment outcome. The absence of a coherent theoretical model for the function of nonverbal expressions in therapeutic interactions has hindered research efforts, therefore evidence-based approaches to optimise the impact of the therapeutic alliance remain limited.

In-vivo and imaginal exposure treatments are often posed as arguments against the need for a therapeutic relationship to achieve exposure outcome, or the need for ‘transference work’. It would be hard now to find a manual that did not state the importance of establishing a therapeutic alliance prior to conducting any form of exposure treatments with successful outcome (Abramowitz, 1996; Thoma & McKay, 2014; Vogel, Hansen, Stiles, & Götestam, 2006). What is not stated explicitly is that the process requires the therapist to be able to influence and successfully persuade the client to brave the feared stimulus in vivo. This influence is possibly ‘earned’ through the application of security and care for the client’s wellbeing and interest expressed towards understanding them. Affective and instrumental social referencing processes suggested by Klinnert et al. may help explain how therapists influence client response (Klinnert, Campos, Sorce, Emde, & Svejda, 1983). These therapist behaviors are rewarding since social safety is crucial to survival, hence maintaining a connection with the therapist and observing the therapist’s fear regulation, presumably outweigh the discomfort the client anticipates or experiences in the exposure, and the achievement over fear may also become intrinsically rewarding.

1.1 Striving for a standardised process model of psychotherapy

The therapist's ability to predict and influence client behavior via the therapeutic interaction can help enhance treatment protocols if not promote client change in itself. This calls for a process model to guide research that seeks interactional moderators and mediators, so relational components or theoretical targets are isolated, thus informing clinical utility. Hayes et al. (Hayes, Long, Levin, & Follette, 2013) stressed that the future of psychotherapy research needs to strive to find the smallest divisible unit for behavioral change that is transdiagnostic and applied across-modalities. The Research Domain Criteria (Kozak & Cuthbert, 2016; National Institute of Mental Health, n.d.) has shifted attention to processes of change and their bio-behavioral impact, thus producing another generation of intervention models that are transdiagnostically unified by functional pathways of change. This paper's proposed theory on relational processes of change has ambitions to contribute to an evidence-based search for coherent and powerful sets of change processes.

Ideally, a model should be grounded in clinical utility and guide how constructs are organised and tested. Thus, we present a functional model of how we believe therapeutic relational nonverbal constructs interact to affect outcome. We see this model as a preliminary framework to be restructured and built-upon as more empirical evidence is gathered. The development of 'third wave' behavioral therapies within contextual behavioral science emphasizes that any theory of human behavior should be evaluated against the criteria of whether the theory improves prediction and control with precision, scope and depth (Hayes, Barnes-Holmes, & Wilson, 2012). With these criteria in mind we propose a way to discriminate and modify patients' maladaptive nonverbal emotional-behavioral responses by cross-fertilising the functional-analysis backbone of Functional analytic psychotherapy (FAP; Kohlenberg & Tsai, 1991; Tsai, Kohlenberg, & Kanter, 2009; Holman, Kanter, Tsai & Kohlenberg, 2017) with affective-neuroscience concepts of primary-process emotional-behavioral systems (PPEB; Panksepp, 2004) as useful functional categories to classify nonverbal affective communication. We frame the function of the therapeutic alliance as a relationship in which clients come to meet the goal of effective needs-seeking whilst under conditions of deprivation and/or threat, as communicated through verbal and nonverbal interactions.

1.2 Nonverbal affective interaction as an active component of therapeutic alliance

A substantial part of social interaction involves interpreting one's own and other people's emotional reactions, predicting reactions from antecedent events, controlling emotional expressions, attempting to influence others' emotions and consequent actions, and sharing emotional reactions to past and present event. How this is done effectively between client and therapist and then generalised into clients' daily relating is proposed to be a key to successful treatment.

Research into emotions within psychotherapeutic interactions is evolving in Cognitive Behavioral Therapy (CBT), backed by accumulative studies from affective neuroscience. Various proprietary treatments have emerged, such as Emotion Focused Therapy (EFT; Greenberg, 2004), Emotionally Focused Therapy for couples (Johnson, 2004) and Compassion Focused Therapy (CFT; Gilbert, 2009, 2014). All these treatments attempt to translate the functions of clients' expressed emotions in session, and shape effective communication, as well as compassionate self-reflection. These goals are consistent with Strupp's (1973) observations of an effective treatment.

A focus of third wave CBT research, with its evidence-based principles, has been to find a methodology to explore emotional behavior within the therapeutic relationship. There tends to be a swing between the cognitive perspective of emotions as verbal representations of physiological sensations, which are highly influenced by learning, to the 'basic emotions' camp informed by evolutionary science and affective neuroscience, which proposes a fixed number of primary affects that applies to all social mammals. Perhaps one should be cautious of the tendency to take sides, as this debate is cloaked behind the out-dated nature versus nurture debate. It is clear that an organism exists in relation to its world with its physiological limitations of the sensations it can experience, whereas our verbal ability allows us to derive a multitude of nuanced descriptions of emotional experiences. Both physiological and verbal sensitivity to the variety of emotional experiences possible is proposed to lie on a gradient in relation to what is elicited, evoked, reinforced or punished by our environment over time. Our best chance of survival is when our physiology and environment interrelate contingently.

1.3 How to define and code emotional behavior?

Research challenges in predicting and influencing emotional behavior lie in how to code emotional behavior within a variety of contexts. Contexts are often coded as narrative themes associated with the occurrence of the NVE rather than a function of communication. A client may or may not cry for many reasons and may or may not explain why. What is relevant to psychotherapy is whether this behavior is aligned with the client's values/goals or reinforces their problem behaviors.

Common in existing literature is an agreement that emotion episodes begin with an anticipatory response to events as rewarding or punishing; good or bad, helpful or harmful; consistent or inconsistent with a person's motives (Roseman, 1984). This allows us to narrow down contextual motivations and argue that we can organise emotional interaction into a limited number of functional classes.

There are various theoretical perspectives on how to organise emotional behavior. Prototype theory conceptualise the verbal representation of emotions as an operant learning process based on studies showing that repeated experiences with similar objects or events lead to generalised mental representation of important elements of the experience. We build verbal descriptions associated with 'emotional events' during a lifetime of recurring situations where we are exposed to verbal influences of others, with the most salient and frequently used verbal categories classified as basic emotions (Rosch, Mervis, Gray, Johnson, & Boyes-Braem, 1976; Shaver, Schwartz, Kirson, & O'Connor, 1987).

Writing about the emotion-elicitation process, Ekman (Ekman, 1984) said, "In automatic appraisal an event is instantly matched with one of the prototypic situations, thereby setting off emotion specific changes in expression and physiology". This assertion is foundational to the theory of basic micro-expressions.

Barrett (Barrett, 2017) put forth a constructionist view refuting the classical theory of primary reflexive emotions with individual properties within the brain. Instead, she presented emotion as an emergent experience arising from a Bayesian brain, making predictions constructed from an organism's interoceptive experiences in concert with a social reality defined by the organism's culture. Emotions are proposed to be interoceptive predictions about future sensory experiences based on past events, which serve a 'body-budgeting' energy regulating function. Barrett suggested that high emotional granularity in verbal description of

experiences help construct more precise emotional experiences, and thus improve prediction for future events.

Persistent interoceptive prediction errors are hypothesized to lead to mental issues such as depression and anxiety (Barrett, Quigley, & Hamilton, 2016; Goodkind et al., 2015; Harel, Tennyson, Fava, & Bar, 2016; Suvak & Barrett, 2011). Neuro-behavioral science suggests patterns of emotional appraisal and behaviors has a neurological basis in hedonic potential and punishment learning from environmental events (Messina, Sambin, Beschoner, & Viviani, 2016; Depue & Morrone-Strupinsky, 2005).

These perspectives approach emotional phenomenon from different layers of analyses of language, contextual behavioral, to neuro-behavioral. Integrating these perspectives gives us a process whereby setting factors (environmental and motivational) elicit and evoke one or more sets of emotional responses and associated physiological states, then occasioning verbal and non-verbal expressions at different levels of complexity leading to action tendencies. An emotion may or may not be manifested directly in behavior, depending on the application of self-control efforts. This then begs the question of how to enhance contextual prediction in order to organise influence over clients' emotional behavior.

1.4 To influence emotional behavior we need to classify functions of the emotional behavior in context

It is difficult to analyse prediction and influence if we only consider the topography of the myriads of environmental events capable of eliciting and evoking idiosyncratic reactions from an individual. This assumes a lack of commonality in environmental conditions and responses between people. For instance, Skinner (Skinner, 1966) has stated that "The task of an experimental analysis is to discover all the variables of which probability of response is a function" (p. 214), therefore we define prototypical emotional responses as probable classes of behaviors which can be elicited and evoked in certain setting conditions.

Jaan Panksepp, an eminent researcher in the field of affective neuroscience (Panksepp, 1998), presented a phylogenetic categorization of Primary Process Emotional Behavioral (PPEB) systems observable in social mammals. PPEB systems are proposed to function like a barometer to detect and activate social needs (such as affiliation and safety) that have

promoted social fitness across human evolution. Nine PPEBs have been suggested to have universal functions for humans (Ellis & Toronchuk, 2013; Panksepp, 1982). These are: SEEKING, LUST, RAGE, CARE, FEAR, PANIC, PLAY, DISGUST and DOMINANCE. Ekman and colleagues' (Ekman, 1992; 1999; 2016; Ekman & Davidson, 1994) research also pointed to species-constant learning of emotional expressions (anger, disgust, fear, happiness, sadness, surprise, and contempt), which have been adaptive to fundamental life-tasks associated with human interactions (Ekman, 2008).

Each PPEB indexes levels of social deprivation, protection and satiation, and elicits its corresponding needs-seeking and satiation behaviors via emotional expression and physiological regulation. These may have begun as reflexes that, over time, became ritualized communication when reinforced with attention from others, resulting in social fitness benefits (Tracy, Randles, & Steckler, 2015).

The link that has not been sufficiently explored is how environmental resources readily meet a person's presenting motivating operation as expressed through nonverbal emotional communication. This problem can be approached through the lens of contextual behavioral science by pragmatically defining motivational antecedents with PPEB systems as a way to enhance prediction and influence within therapy. "Biological events are not treated as underlying, mediating, or modulating behavioral events. Rather, biological events are approached, measured, analyzed, and understood as part of the behavioral system under investigation, and thus they are seen as participating in functional relations with past and current behavioral contingencies." (Barnes-Holmes, 2003)

So rather than having a topographical coding of all the contextual discriminative stimuli that a person can encounter in the course of their life, it is much more efficacious to consider a limited number of motivational categories that serve as setting factors.

It is emphasized that this article presents PPEB categories not as ontological explanations for emotional behaviors, but as pragmatically operationalized nonverbal events (NVE). This type of categorization increases the granularity of emotional experience for the therapist and client, so they can better communicate and co-regulate social needs.

From a functional contextual perspective, these PPEB categories and associated repertoire of NVEs offer taxonomy for the prediction and influence of clinically relevant behaviors (CRBs) and can extend the scope and depth of understanding of key reinforcement processes

in a functional analysis. This will provide more precise discrimination of clients' emotional need-states that, in turn, can refine therapy responses emitted to influence adaptive behavioral change in the service of effective needs-seeking.

A key issue of relevance to psychotherapy is that PPEB are proposed to function relationally with the needs-seeker expressing prototypical social signals of deprivation, protection or satiation to a helper who then responds with corresponding attention, safety and support to satiate the need (Shariff & Tracy, 2011). Therefore, the therapeutic alliance can present a ubiquitous interpersonal context that affords the opportunity to shape the three behavioral domains of: needs-seeking, needs-recognition and needs-satisfaction. This interrelation of needs-seeking and needs-recognition behaviors within the therapeutic dyad enable learning of effective and autonomous needs-satisfaction on the part of the client.

This Needs-Satisfaction Process (NSP) presented in this article (section 3.0), shows how the dyadic interaction may function as the intervention. Consequently, the effectiveness of the therapeutic alliance in mediating treatment outcome in our conceptualization is dependent on the therapist facilitating a safe context for the expression of the client's psychosocial needs based on the full range of PPEBs. This helps the client to become proficient at needs-seeking across contexts, first, by evoking effective help from the therapist, then generalizing this to other relationships and naturalistic interactions.

A delineated *intra-* and *inter-relational* levels of nonverbal CRB detection is presented below, with client/therapist PPEB CRBs on an *intra-relational* level of needs detection, opening out to the *inter-relational* Needs-Satisfaction process CRBs, indicating the degree of NSP efficacy between client and therapist.

2.0 A robust analysis of nonverbal events (NVE) in psychotherapy

Importantly, clients may not always convey expression of needs verbally. As much as sixty percent of communication is nonverbal, defined as behaviors other than words that form a socially shared encoding system (Burgoon, 1985). A plausible function of human NVE is to meet phylogenetic psychosocial needs and emit signals to others that indicate states of deprivation, satiation (with incentive values), or aversive conditions. Impaired functioning of these processes is a common target in psychotherapy (Ciarrochi, Deane, Wilson, & Rickwood, 2010; Landes, Kanter, Weeks, & Busch, 2013).

NVE encompass both the nonverbal behaviors (NVB) of client and therapist as well as their nonverbal communication (NVC) (see Wiener, Devoe, Rubinow, & Geller, 1972 for a more detailed discussion on the distinctions between NVB and NVC). We propose NVE can be translated into functional PPEB categories in order to research nonverbal human behavior across the context of human life.

2.1 Functional Analytic Psychotherapy (FAP) applied as a nonverbal PPEB detector

FAP focuses on detecting and responding to clinically relevant behaviors (CRBs) as they emerge in the psychotherapeutic relationship. The functional analytic and behavioral shaping process inherent in FAP offers a most useful framework to guide the detailed tracking of verbal and nonverbal PPEB needs-seeking and needs-recognition behaviors of both client and therapist, allowing therapist and clients to generate contextual similarities between therapeutic and outside relationships, hence the therapeutic relationship becomes the mechanism of change (Follette et al., 1996).

FAP therapists are encouraged to respond contingently in session with a caring alliance that naturally reinforces target behaviors and extinguishes problematic ones. However, what is a ‘naturally reinforcing’ or ‘problematic’ behavior can be defined with more precision by applying a *functional* understanding of PPEB NVE repertoires.

Problematic behaviors are defined as PPEB expressions that fail to meet contextual social needs, such as:

1. Inability of the needs-seeker to identify contextual needs
2. Ineffective expression of needs-seeking NVC
3. Inability of the helper to decode NVC from the needs-seeker and offer effective support
4. Difficulty by the needs-seeker to recognise and receive support from the helper, possibly due to NVB which blocks or deters approach from others (i.e. lack of eye contact, closed posture, frozen).

2.2 CRBs and the five rules of FAP as mechanisms of change

At the heart of the FAP process is the specification of CRBs (Tsai, Kohlenberg, & Kanter, 2009). CRB1s are in-session instances of behavior that functionally relate to the daily life problems that interfere with relationships. CRB2s are in-session instances of improvement behaviors. CRB1s and CRB2s are collaboratively identified by the therapist and client and will evolve over time as the client's competence in expressing CRB2s improves.

FAP's main mechanism of action is contingent natural responding by the therapist to CRBs guided by five operational rules: 1) Watch for CRBs, 2) Evoke CRB2s, 3) Naturally Reinforce CRB2s, 4) Notice Therapist Impact, 5) Interpret and Generalize (Kohlenberg & Tsai, 1991; Kohlenberg, Kanter, Bolling, Parker, & Tsai, 2002). The specific contingent reinforcement required in rule 3 is the active change component that allows the therapist to reinforce approximations of improvement behaviors. Rule 3 establishes the need for therapists to pay attention to the function of clients' nonverbal events (NVEs) in order to actuate this key component of therapeutic change (Follette et al., 1996; Wampold, 2015). Enhancing the process of influence is inherent in the FAP process, what is needed is more precision over which behaviors clinicians need to target.

We argue that there is a need for an elaboration to the FAP framework that specifies the contingent nonverbal CRBs in the therapeutic interaction; sometimes labelled as 'attunement' in psychotherapy. Developmental research has highlighted how attuned responsiveness by caregivers has consequences for a child's capacity for self-regulation of affect. These findings have been replicated in research on adult psychotherapeutic relationships (Schore, 2001). The Needs-Satisfaction process (NSP) combined with the functional guide of PPEB CRBs advances CRB identification in FAP to offer a systematic way to train therapist attunement to key nonverbal emotional-behavioral variables, followed with the application of compassionate targeted interventions.

3.0 The relevance of Primary Process Emotional-Behavioral Systems (PPEB)

Panksepp's (K. L. Davis & Panksepp, 2011; Panksepp, 1982; 1998) research identified seven primordial primary emotional-behavioral systems (PPEB). Their functions are associated with distinct forms of arousal that is either rewarding or punishing.

The positive valence rewarding PPEBs are: SEEKING¹ (checking to have needs met); LUST (attraction); CARE (caretaking of others); and PLAY (curiosity and joy). These signal social needs that encompass pro-social values.

The negative valence punishing PPEB are: ANGER (protection, unmet needs); FEAR (identifying danger); and PANIC (fear related to loss of attachment figure) (Panksepp, Asma, & Curran, 2012). Ellis and Toronchuk proposed two more PPEB that are featured in high social-order mammals: DOMINANCE (mastery over environment and social ranking) and DISGUST/SHAME (enforcement of social order after deviation) (Toronchuk & Ellis, 2007). These signal individual needs that are related to self-protection (Ellis & Toronchuk, 2013).

The PPEB categories proposed offers the most elemental division of human behavior which can be functionally applied across the context of human life. Compassion-focused therapy is based on the same theoretical foundation with broader motivational categories of threat, seeking and soothing (Gilbert, 2014).

Orientating the function of nonverbal behaviors within these categories serves a pragmatic goal to help therapists calibrate prediction and influence at a granular level of interaction, so dysfunctional behavioral patterns can be recognized easily with functional behaviors naturally arising from adaptive expressions of the PPEB categories.

It is useful to use these categories functionally to represent a set of emotional-behavioral repertoires to aid competence in the Needs-satisfaction process. Ellis and Toronchuk (2013) observed: “Dysfunctional aspects (of primary emotions) can be associated with behavioral or psychiatric disorders...” Consequently, it is relevant that psychotherapeutic interventions have the depth to access emotional NVC that can influence the client’s adaptive needs-expressions appropriate to environmental demands.

Other signs of the relevance of PPEB to psychotherapy are the evidence that the regulation of the social-needs requires complementary needs-recognition and/or needs-satiation responses from another person. This conceptualization is consistent with the Social Baseline theory (Beckes & Coan, 2011; Coan, 2011; Coan & Maresh, 2014; Coan & Sbarra, 2015) which proposes that human baseline physiological functioning necessitates social contact.

¹ Consistent with previous work in this area and for clarity, PPEB systems are written in block capitals (Panksepp, 2004).

3.1 PPEB as consequences of likely environmental conditions

To classify PPEB functionally requires consideration of the types of environmental pressures or benefits that reinforced them within the person's learning history. Skinner pertinently asked, "If the behavior in which we are interested is conditioned, to what deprivation was the reinforcement related? What is the recent history of this deprivation?" (Skinner, 1953, pp158).

Behavior theory models of emotion (Michael, 1993; Sundberg, 1993) presented the motivating operation (MO) as a pivotal antecedent to 'emotional experience'. The MO describes conditions of deprivation, aversiveness and satiation (incentive) (see Skinner, 1953, pp. 141–159). MO can elicit PPEB as the neurophysiological response for emotional cues and, through stimulus-stimulus relations and culturally derived learning; these unconditioned cues develop into social expressive signals and verbal representations that have the power to evoke responses from an observer (Tracy et al., 2015). For example, if a child cries under aversive conditions, the mother becomes the stimulus salient for safety, especially if the child's approach was reinforced in the past with a CARE response of kisses and soothing. For the mother, the crying becomes the discriminative stimulus (Sd), signalling care-taking, especially if it was negatively reinforced with the child calming down. But, if the mother is persistently sleep deprived, the Sd of crying may become a salient punisher for the mother, and may prompt self-protective ANGER (shouting in frustration, leaving the room). In another example, if two lovers have been deprived of affiliative contact for a week, on seeing each other the satiation behaviors of conversation and physical affection become more reinforcing and strengthen the control of deprivation of the need for affiliative contact.

If needs-seeking behavior is associated with PPEB under the control of deprivation and aversive conditions and reinforced through accumulated incentive values learned from previous satiation episodes, then observing NVEs in session can offer clues to the type of antecedent MO variables that shaped needs-seeking behaviors. Accurately identifying the MO controlling variables at play in the therapeutic exchange offers the clinician greater prediction and influence over the therapeutic intervention, which, in turn, helps shape the client's capacity to exercise their PPEB prediction and expression effectively in daily life.

3.2 What are the functions of PPEB in daily life?

If MO indicates conditions evoking needs expression, then PPEB help to categorise what those basic needs are. PPEB can be experienced via the interoceptive network as valence and level of arousal (Barrett, 2017) or transformed through verbal learning into expressions conditional on the culture of the verbal community. Expressed behaviors, verbal and nonverbal, can be classified within each PPEB as a response to environmental pressures. Some concrete examples of these behaviors and their functions are presented in **Table 1**.

The integration of these PPEB systems into FAP's CRB framework offers an overall conceptualization that is able to discriminate between ineffective needs-regulating expressions of PPEB as CRB1, and a contingent regulated expression of PPEB with effective needs-seeking and satiation behaviors as CRB2.

(Insert table 1 here)

3.3 A Guide to using PPEB CRBs to enhance execution of FAP rules 1, 2 and 3

Tables 2 and 3 present prototypical nonverbal client PPEB CRBs, and therapist PPEB T1 (therapist problem behaviors) and T2s (helpful behaviors), that are salient in session. These proposed range of behaviors can be the discriminative stimuli for therapists to identify prosocial or self-protective PPEB expressions, which, in turn, can be used to make predictions of the antecedent conditions that occasioned the emotional experience. The FAP rules of: 1) Watch for CRBs, 2) Evoke CRBs, 3) Naturally Reinforce CRB2s are helped by the CRBs and T2s suggested in the table.

When the PPEB expressions are not effective in clients' daily life, this indicates that they may be under the control of our clients' complex verbal operants from their life history. Barrett stated that emotions are constructed by a Bayesian brain within a social reality, so the prediction can only be as good as the emotional concepts the perceiver has learnt or able to create (Barrett & Simmons, 2015). Prediction errors or mismatching of emotional experience to context demonstrates that the client is under the control of their past social reality. The therapist then serves the double function of modelling mindful tracking of contingent experiences, and acts as a natural reinforcer of affiliative interaction with compassionate curiosity and deep attunement to correct interpersonal prediction errors.

The topographical example of behaviors stated in tables 2 and 3 are a 'rule of thumb' guide.

The functional nature of the table can robustly accommodate our clients' idiosyncratic behaviors, so a clinician can be trained to notice the workability of a behavior based on its function in a given context rather than make a specific behavior a symptom target, insensitive to context, as has been the criticism within DSM classifications. This functional process approach allows practitioner flexibility "with movable elements that can deal with client complexity" (Hayes & Hofmann, 2017).

The taxonomy of PPEB CRBs within tables 1 and 2 can be used to identify the motivating operation of deprivation, aversive condition or satiation responses underlying client's behaviors as well as help clinicians to sort the expression of each PPEB into CRB1/2s (maladaptive or adaptive) then use T2 to guide therapist to emit the most reinforcing behavior to validate client emotional experience and reinforce adaptive expression of the PPEB (CRB2).

Insert tables 2 and 3 here

3.4 Therapist needs-recognition as assessment and reinforcement:

FAP rules 1, 2 and 3.

The therapist offers a needs-recognition function that assists the client to find a way of meeting their basic social needs effectively in their daily life. An ideal given is that the therapist displays CARE and DOMINANCE, so the client is entering into a nurturing environment where their needs for care-taking and the therapist's expression of competence, control and safety is available. How contingently the client takes from this ready nourishment can highlight how client CRBs are controlled by their learning history, with their Needs-Satisfaction Process (NSP) skills being dependent on their history of competency.

A case example:

Client A, a 30 years old lady who had repeated trauma of unmet socio-emotional needs with both parents being demanding and dependent by prioritising their own needs and punished the client's expression of vulnerability. On presentation, A showed good social interaction skills by describing her problems cogently, responsive to the therapist's questions and keen to be helpful to the therapist.

The first author as the therapist had to investigate the incongruity of the client's referral

diagnosis of bipolar disorder, history of emotional dysregulation, self-harm and attempted suicide with the intelligent and affable lady presented. Taking the verbal content on its own did not reveal any in-session maladaptive behaviors. A was well versed with her history since she has been through many courses of therapy and psychiatric treatment. A appeared to have good self-awareness, at least in hindsight, yet when A was asked to slow down her attention to track her physical sensations and whether she has a sense of what she needs right now, a host of CRB1 behaviors manifested. A became very uncomfortable, self-critical when she didn't know. A felt she failed the task.

Since the function of the therapeutic relationship is proposed to be the client care-seek from the therapist (then over the course of treatment becoming more competent with their presenting problems), the immediate assessment was how contingently the client was able to express her SEEKING and PANIC attachment repertoires by tracking the type of reaction the client evoked from the therapist (T1/2, table 3) and reciprocally observe the client's CRBs (table 2) to how they respond to the therapist's CARE T2 responses.

The therapist (T) noticed that A did not clearly register the therapist CARE-taking role. A described her problematic history then proceeded to explain and analyse her problems without giving T enough space to interact with T2s. It was equivalent to the client giving out care-seeking distress signals yet not registering that help is heard and allowing another person to assist (demonstrating CRB2 in PANIC).

Referring to SEEKING in table 2, T observed A was able to describe her problematic history, yet when T offered curiosity and verbal validation of client's difficulties and expressed warmth in her voice and face (T2 of SEEKING and CARE), A seemed to not notice (no CRB2 in SEEKING observed), so there may be insensitivity to the present contingencies of CARE. The SEEKING searching and problem-solving behaviors continued at the same pace and intensity.

When T expressed curiosity (SEEKING T2) by asking open questions with relaxed posture and expression of interest, A apologised for being difficult, not clear with her history, and showed shame when she didn't know how to reply or how to help herself (DOMINANCE/Shame CRB1s). This may indicate a CRB1 of excessive independence and rejecting CARE influence from others, yet once calibrated this independence can become competent self-care CRB2s.

A looked at the therapist infrequently whilst talking (Shame CRB1), yet when she did check, her eyes were wide and vigilant (FEAR CRB1). She looked downwards, gave apologetic smiles and held her body rigidly, her hands were very figety (FEAR, DOMINANCE and Shame CRB1s expressed as appeasing, withdrawing behaviors).

Tracking is a contingent self-care skill of checking in, tracking pleasant/unpleasant sensations, and the ability to describe any needs she pick up, such as physical discomfort, thirst, or hunger. CARE CRBs evoked with this task can give us an indication of whether A's behavior is under the control of deprivation, aversive conditions, or both. A's self-critical responses indicated aversive control, and her difficulty in tracking and describing her physical sensations may also sustain deprivation, since if she cannot pick up the discomfort of deprivation, she cannot act to help herself meet needs. This hypothesis was backed up by A's history of eating disorder and her DISGUST CRB1 response to her body.

To assess and evoke A's attachment repertoire in her PANIC system, A was asked to notice the first author's response to her after relating a sad story.

T: Can you describe the expression on my face?

A: I can't read you, you look neutral. I don't know what I am supposed to do. (FEAR CRB1; The therapist showed a clear expression of concern and care. There's fear on A's face and she became physically agitated, fidgeting more)

T: I feel sad and concerned for you. My instinct hearing that was feeling angry at your parents and wanting to protect you. (DOMINANCE/ANGER/CARE T2s)

A: I was a difficult child. I get myself into these situations. I know what I need to do but I don't. (A's face was hard, and voice firm and stoical; DOMINANCE/ANGER CRB1)

T: *notice T1 of feeling rejected and pushed away (DOMINANCE and ANGER T1s of Useless, helplessness; PANIC T1, rejection; have to calibrate to DOMINANCE / CARE T2, therapist stayed in control to maintained safety, and gave a compassionate smile)

A: I don't like you looking at me, why are you smiling? (ANGER CRB1; Frowning and annoyed)

The therapist's DOMINANCE and CARE T2 of creating a safe environment and

communicating warmth and understanding evoked many negative valence CRB1s. Client A clearly struggled to ask for and receive care experientially. The PPEB CRB table offers the therapist target CRB2s to shape up in each system to help the client to learn successful Needs-Satisfaction Process skills (explained in section 3.0).

Continuous assessment of competence is made of the client's nonverbal repertoire for PPEB needs-seeking and recognition for self and others, as well as the ability to satiate their own and other people's PPEB needs, so they can operate in the world with autonomy, competency and relatedness; that is, they satisfy the basic human need for self-determination (Deci & Ryan, 2009; Ryan & Deci, 2008).

3.5 Watch for therapist's PPEB impact on interactions: FAP rule 4

Therapists set the motivating operation of satiation for the client by providing a safe and caring environment with effective reinforcement for adaptive expressions of PPEB. By purposefully targeting intervention at antecedents and reinforcement, the therapist will increase the likelihood of transforming the function of behavior from maladaptive self-protection that is insensitive to interpersonal context, to prosocial behavior capable of evoking positive PPEB behaviors from others.

The therapist, of course, has their own set of behaviors controlled by the MO conditions of deprivation, aversive and satiation, and these are expressed through the performance of in-session behaviors labelled as T1 and 2 (Table 3). T1 can evoke and reinforce client CRB1s and punish client CRB2s. On the other hand, therapist's regulated, motivating incentive states are T2s, targeted to contingently reinforce client CRB2s in each PPEB domain.

In Table 3, we offered 'rule-of-thumb' therapist responses (T2s) that can shape more effective client self-regulation. We emphasize that clinicians need to become proficient in attuning to expressions of client PPEB so that the verbal and nonverbal behaviors are consistent and aligned. For example, if a client is engaging in a CRB2 of describing a vulnerable loss and the therapist says, "I feel your sadness" with a social smile but without the congruent cues of sadness in his tone of voice, the validation loses its power. In some cases, the client may need to see and experience an amplified expression of caring sadness from the therapist to counter a weak learning history in CARE recognition.

By utilising information provided in Table 3, therapists can increase precision in the client CRB2 evoked, and follow up with FAP rules 3 and 4 emotional-behavioral reinforcements to improve client's PPEB needs-satisfaction skills. This granular behavioral guide based on PPEB nonverbal interaction can support the process of deep attunement that can make an important contribution to the therapeutic alliance and may create the condition to increase therapeutic efficacy.

3.6 How to identify nonverbal PPEB expressions in session

The motivating operation (MO) is the antecedent that evokes PPEB-responses. In session, the therapist can observe the function arising from these PPEB as they appear in nonverbal (NVB) and verbal behavior via three regulatory pathways (Cicchetti, Ackerman, & Izard, 1995)

1) **Neural processes**: i.e. primarily autonomic, somatic and psycho-neuroendocrine nervous functions, some of which are observable through respiration rate, pupillary responses, skin colour/texture, body temperature, muscle tension, condition of health (i.e. tiredness, fitness, weight, smell), sweating, pulse in carotid artery and forms of psychogenic movements (e.g. myoclonic jerks; (Hinson & Haren, 2006)). The therapist can use these cues to infer antecedent and current conditions the client is under by observing these NVBs.

2) **Expressive display**: i.e. overt behavioral responses, referred to as nonverbal communication (NVC), signalling to others their emotional state in facial expressions, prosody and body language, such as laughing, smiling, weeping, and aggressive posturing. Ekman's (Ekman, 2007) extensive body of research on micro-emotion detection offers useful CRB2 indicators in this regard. Effective NVC recognition aligns the therapist to the function of the client's emotional needs rather than their verbal content, as the content is under operant learning history.

3) **Subjective emotional experiences**: i.e. private events that can be observed and described only by the person experiencing them, so CRBs take the form of symbolic or metaphorical communication. It is useful to assess whether the client's subjective communication of their emotional experience is congruent with their autonomic and expressive displays as observed by the therapist.

Functionally inflexible, non-contingent or sparse expression of needs as CRB1s can be detected when there is a mismatch between non-verbal PPEB expressions to situational demands and verbal communication channels. Ineffective NVC of PPEB CRB1s and T1s often involve an inflexible calibration of:

- Emotional intensity
- Saliency
- Mismatch to context
- Displacement of one emotional expression for another that was reinforced in learning history

Our proposal is that if therapists improve their ability to discriminate disjunction between these three pathways and use the Needs-Satisfaction Process to shape effective CRB2s, the outcome will be a more harmonious interaction between the three pathways within contextual demands.

Most forms of talking therapy rely on verbal expressions of need (i.e. we ask patients to express their subjective needs as elucidated in pathway 3 above). This is ineffective when the patient does not have the learning history to support such expressions, making autonomic and nonverbal expressions crucial variables for formulation of the client's need state.

For clarity of communication, the autonomic and expressive CRBs are labelled nonverbal because we are not focusing on content, although strictly speaking we appreciate that these behaviors are inextricably linked to verbal processes (Brooks et al., 2016; Dougher, Hamilton, Fink, & Harrington, 2007). The proposed guide to PPEB CRBs (tables 2 and 3) provides an algorithm for turning private events into in-session observable variables that can be tracked by both client and therapist.

4.0 Differentiating between *intra-relational* and *inter-relational* process CRBs

A distinction is made between two layers of processes that a therapist can detect. The *intra-relational* level of PPEB nonverbal CRBs as expressed individually by the client and

therapist (illustrated in Tables 2 and 3), functions within an *inter-relational* level of Needs-Satisfaction Process CRBs, which concerns how well the client and therapist interact to meet the Needs-Satisfaction process (NSP) of psychotherapy.

The two levels are interlinked as both serve the same function of regulating an individual within a social environment, in this case, within a psychotherapeutic relationship. Therefore, PPEB expressions that manifest within the functions of the psychotherapeutic relationship can be generalised into daily life.

The therapist can zoom in on the intra-relational self-regulation of PPEB CRBs or pan out to observe the inter-relational regulation of NSP CRBs. The application of the NSP CRBs can be tracked within 5 steps.

4.1 Needs-Satisfaction Process (NSP) within FAP

Figure 1 here

In session, the client enters into a relational context of a supportive environment with a therapist that serves a needs-recognition and support function. The client is usually in some kind of distress and the therapist sets the incentive value for the interaction by being compassionately supportive to help resolve this distress. With regard to Rule 1 of FAP (i.e. watch for CRBs), it is useful to track how the range of PPEB are expressed as needs-seeking behavior by the client and what is reciprocally evoked from the therapist (see Tables 2 & 3). As emphasised before, the verbal content itself is not sufficient as an indicator. The therapist is required to gather other observable variables from the client, from the therapeutic environment, and from the therapist's own internal experience to map the client's sphere of influence and control.

The Needs-Satisfaction Process is proposed to be the operationalized function of the therapeutic relationship. The therapist observe what kind of client needs-seeking, recognition and satisfaction behaviors are occasioned by each of the MO conditions (e.g. which PPEB need is being expressed, thwarted, met or otherwise). The therapist uses their response as a barometer (see Table 3- therapist behaviors) then calibrates responses to the function of the client's NVEs with corresponding needs-recognition (FAP Rules 1,2,3).

The therapist then observes their impact on the client (Rule 4) to see if this offering is recognised by the client and absorbed illustrated by needs-satiation responses (Rule 1), as indicated not only by their verbal assurance but also check for observable autonomic signs of restore to resting state (Rules 1, 3), thus completing the cycle of needs-seeking, recognition and satisfaction.

Lastly, the client and therapist collaboratively solve how to transfer this in-session process into their daily life interactions (Rule 5). This involves various in-vivo exercises to reduce experiential avoidance and to upregulate expressions of positive emotions. For example, by telling others of the loss he is experiencing with accompanying NVEs of vulnerability and care-seeking followed by NVC of restoration of safety or sharing a moment of joy with others with salient expressions. If the NSP is inflexible across contexts, then the ineffective NSP CRB1s provide valuable insight into the client's learning history and self-protective repertoire, which can be explored to enable the client to reach a deep compassionate understanding as well as setting awareness for change.

4.2 Five Needs-Satisfaction Process (NSP) CRB2s to reinforce

The NSP CRB2s is a co-created experience, which applies to both client and therapist. The therapist tracks the fluidity of interaction through the steps, and judiciously express their NSP CRBs for the purpose of assessing client competence as well as for shaping up areas of ineffective NSP communication (see Table 4).

Insert Table 4

Of course, not all client needs may be met, depending on whether the client's expectations match situational demands and consequences. When external sources cannot meet needs-seeking, clients can apply self-soothing and self-care skills, and if there is a skills deficit, then the therapist's expressed CARE in the NSP can become a source for modelling, as in compassion-focused therapy.

The NSP process is not linear since human interaction is an imperfect process. As illustrated by the algorithm in Chart 1, the therapist and client may need to repeat each step, move forward, go back, then always end each session with FAP rule 5 in the learning stage,

prepared to take the adaptive experiences the client gained from the session to practice in their daily life.

Insert chart 1.

4.3 Needs-Satisfaction Process *problem behaviors* – Client NSP CRB1s

In accordance to rule 1 of FAP- watch for CRBs, CRB1s can emerge corresponding to each stage of the Needs-Satisfaction Process. These problem behaviors tend to be inflexible across context and do not functionally serve needs-satisfaction for the client, or needs are met in the short-term without building incentive-value in the interaction for the client and their helpers, resulting in conflicts in relationships. Examples of these are illustrated:

1. *Awareness of MO* – The client can experience difficulty recognising and describing their sense of vulnerability and their PPEB profile of needs. The therapist need to establish which motivating operation is controlling the client.

Aversive condition: In session client may present unresponsive or submissive with closed posture, low-level of eye contact and unable or unwilling to describe their problems fully. They often reply “I don’t know” to questions about themselves, to tracking their sensations, or stay silent. Alternatively, a client may describe what other people say about them and unable to track their own sensations or describe own experiences. Conversely, they may be hypersensitive to threat (i.e. misreading therapist as angry, hypervigilant to the therapist evidenced by their eye moments tracking the therapist’s movement, be physically skittish, not fully settled in the chair, their affect reactive to therapist expressions).

The therapist check if their corresponding defensive repertoire is evoked as T1s (a barometer to assess client MO, in this case aversive condition), then refer to functional T2s, such as giving the client space to feel safe in the room, validate how difficult it is to be the client and the difficult situation they are in (defuse ANGER), reassure client they can pace the session and therapist will follow their lead (Dominance/control), and the therapist internally exercise self-care and grounding to not become defensive or submissive to client’s disdain (T2 CARE and DOMINANCE)

Deprivation: They may be under conditions of deprivation as demonstrated by intense demands, delay session endings, quibble over cost, or worried about not doing enough. Conversely, they may be inattentive and insensitive to their surroundings and the therapist, reply “I don’t know” to questions about what they need and to describing any discomforts. T1 in ANGER system to client demands may indicate either excessive client demand or the therapist’s own level of deprivation. Client CRB2s can be shaped with corresponding T2s in SEEKING and PANIC.

Through observing the client’s behavior, the therapist can test which PPEB system is activated and whether it is under aversive control, deprivation or interaction of both. CARE is fundamental for the therapist to maintain as key to compassion and DOMINANCE maintains a safe controlled environment for both.

The therapist needs to calibrate their degree of CARE and Dominance, so it remains within the T2 limit, enough to challenge and shape up client safety and competence. Too little or too much, the therapist may reinforce client’s helplessness and other CRB1s. All through the therapist keeps the process transparent by gently describing their experience of the client (FAP rules 1 and 4), which is in itself evocative (FAP rule 2), so the client become accustomed to the process of functional analysis and discriminating their impact on the therapist. At this stage, the therapist aims to reinforce verbalisation or clear expression of PPEB needs from the client (FAP rule 3).

2. *Needs-seeking* – The client knows what they need but struggles to approach the therapist for help, to affirm or share vulnerability (i.e. unrelenting standards and self-critical), or the approach behavior is ineffective for evoking the outcome the client needs, i.e. if client asks aggressively (ANGER and DOMINANCE) or weakly (SHAME and submission), instead of care-seeking, this is likely to evoke defence from the therapist, not CARE expressions. The client can be stuck in anxiety by talking about the content of what they are afraid of (PANIC/FEAR), rather than communicate and express the underlying need for CARE and safety from the therapist. The client finds it difficult to affirm their needs, because they might have a verbal rule that it is “selfish”, or they are “worthless” (DISGUST/SHAME). Certain needs may not be salient because it has not been reinforced over years, (i.e. pleasure in socialising or playfulness) with reduced incentive value to express these needs. The therapeutic NVC of CARE or PLAY can ‘awaken’ this need, and

through the accumulation of incentive value of exchanging pro-social PPEB expressions with therapist, affiliative NVC will become stronger over time.

3. *Needs-recognition* – The client either cannot register the experience of the PPEBs expressed by self or therapist (hence others) or struggles to receive it (i.e. CARE and joy). The therapist compassionately feeds back their experience of the client's ineffective needs-recognition. "I notice you look anxious when you are telling me about the panic you experienced, you didn't look at me even though you said you felt very alone when you are anxious. I feel excluded. I wonder if you are like this with people in your life?" "Can you notice me when you tell me how afraid and alone you feel and sense I am here for you?"

Description of the client's process may evoke more CRB1s (i.e. shame and self-criticism with avoidance), so the therapist model compassionate curiosity to guide client to the CRB2 of effective needs-recognition, which involves shaping up client awareness of their needs-seeking impact on the therapist and track the therapist's response. The client needs to know their distress signals are being seen and heard.

The client may also blame others or complain about unmet needs yet cannot see the recognition offered to them by the therapist, so the client need to be directed away from their narrative, with their awareness placed on tracking the therapist's NVC of recognition and support. Clients may have rigid rules; ("receiving help is weak", "I will be controlled if they know my vulnerability"; DOMINANCE/DISGUST) or self-judgements ("I am selfish, weak, failure", "I don't deserve help"; SHAME/FEAR), which blocks them from receiving therapist recognition. Clients may be unable to read CARE or see CARE expressions as non-expression/neutral face and this uncertainty can trigger anxiety.

This stage needs to be characterised by very slow tracking of NVC of the therapist and the client's own physical sensations. Therapist may ask permission to hold the client's hand to help them detect the therapist's presence if they appear physically frozen. The client needs to learn to discriminate the sensations of having needs seen and sense the presence and protection of the therapist.

4. *Needs-satisfaction* - The client may express care-seeking and care-recognition effectively yet CRB1 may be lack of *satiating-recognition*, a "leaky bucket" problem, where

the client may (or may not) see and hear the support but is disconnected from the sensations of opening up to the therapist's CARE expressions. CARE can be 'leaked away' by the client not being connected to their sensory experiences of safety and comfort from the expressed CARE of the therapist's presence; or verbally dismiss/ block the support the therapist offers. The client's body may be frozen as a defensive interpersonal trauma reaction (Schoore, 2001).

CRB1 could be the displacement of satiation on to other behaviors (Skinner, 1953), i.e. the mismatch of LUST response to therapist CARE is a CRB1 where the client confuses CARE-taking and care-seeking with sexualised approach behavior commonly seen with history of sexual abuse. It is worth checking action tendencies or urges in or after the session as a consequence of intense emotional work by asking the client at emotionally heightened moments, "do you have a desire/ urge to do anything right now, or after you leave me, to avoid this feeling/ to feel better?" A client disclosed she would masturbate after conflict with her boyfriend as a way to self-soothe. To comfort-eat or go shopping after therapy can be a satiation or self-soothing behavior displaced in satiating social needs.

Needs-satisfaction involves experiencing positive experiences of; safety, comfort (Care-seeking/CARE), playfulness, creativity and joy (PLAY), noticing attraction and feeling attractive (LUST), and being assertive, competent and in control (ANGER/DOMINANCE). The therapist needs to track clients NVB to see a return to resting state, which the therapist may need to calibrate to a less tense state each time if client baseline is high distress or frozen. In the experience of joy, the therapist may need to help client register and upregulate sensations of joy, so it becomes more salient for the client.

5 Learning - The client can punish incremental learning of self-awareness or behavioral change with self-critical or "not enough" deprivation narratives, for example; "I don't deserve"; "not good enough"; "I should know better now"; "change is too slow"; "you are not good enough"; "I've gone backward" and "Most people can do this and I can't". This behavior highlights that the client is under aversive verbal control of their negative schemas. A trauma history of aversive relationships can also be evoked if aspects of therapeutic NVC maps onto this history (P. A. Levine, 2010) i.e. emotional intensity of the work, therapist's vulnerability/needs appear in session, even the care that is offered to client can map on to a trauma history where a parent used excessive CARE-taking to control the client.

It is worth noting that most clients have a needs-invalidating parental control history where the caretakers prioritise their needs above the vulnerable child's (Barber, 1996). The verbal communication justifies that they are doing it for the child, but the consequence of NVC matches the caretaker's needs not the child's. This may be how incongruence between verbal reasons for behavior and NVC is modelled.

Since therapist-client relationship parallels that of carer and care-seeker, therapists are required to have an awareness of whether interactions function to serve the client's or personal needs. Checking the impact of therapeutic interactions in session (Rule 4) helps to assess ineffective and self-serving therapist control behavior (T1) or T2 behaviors of effective CARE and control in the service of the client.

This last stage of cognitive learning aims to fully integrate the sensorial and experiential learning of the prior 4 stages by creating verbal instructions to represent the adaptive process they experienced. This verbal instruction is crucial to help clients generalise in-session process into their daily life. The learning stage is congruent with FAP rule 5.

4.4 Therapist problem behaviors (T1s)

As with the PPEB T1s in table 3, therapists also bring their own idiosyncratic NSP interaction into the session, which may reinforce or punish client NSP CRB2s. In FAP rule 4, the therapist is made aware of their behavioral impact on clients, and we stress that recognition of the therapist's NV NSPs is crucial for effective interventions that target client CRB2s.

Like clients, the therapist may over-use a limited PPEB expression due to their learning history, thus evoking limited client response. As a result, the full range of PPEB expression from the client is not assessed for psychological flexibility. For example, a therapist can be DOMINANT in their didactic professional style; over-use CARE without assessing the client's ability to CARE-take; the therapist may have a blind spot for the client's NVC of less salient PPEB systems: the therapist's failure to spot the client's attraction or their own LUST expression.

The therapist can bring their own needs-seeking, arising from daily life deprivation, into the session without noticing the client's care-taking or, through over-control, inadvertently punishing the client's autonomy. Therapists may struggle with clear positive valence expressions of CARE and PLAY or neglect to create enough affiliative interactions. These include validation, compassion and moments of respite from client distress. At NSP step 5, the therapist may fail to work on generalising the behavioral change into the client's life, so that the client may succeed easily with the therapist but fail or 'be disappointed' in their daily life.

5.0 Orchestrating the PPEB through the Needs-Satisfaction process

The therapist awareness of nonverbal variables is like that of a conductor. The orchestra contains the timbre of the PPEB expressions, and the interaction between the conductor and orchestra is the NSP, which reflects the harmonic creations of various human conditions. The PPEB of both the therapist and client can be expanded through this mutual NSP.

CRB1s and T1s have the consequence of punishing new learning and behavioral changes by making the therapeutic interaction avoidant and aversive. For intervention, it is useful to slow down interactions, repeat the awareness step of tracking and describing the interaction (refer to Table 2). The clients then generate their own verbal process rules for steps 1-4 based on verbal descriptions of workable experiences; this process is practiced until new learning is consolidated. All along the therapist reinforces new learning with compassionate validation and accompanying PPEB NVC. This interpersonal process is summarised in The Needs-Satisfaction process interaction flowchart below.

Following the NSP dyadic-interaction flowchart can help inform predictions about the antecedent MO condition the client is under, whether the MO is contingent to the client's present context or derived from the client's learning history. It also helps to gauge the effectiveness of the nonverbal PPEB expressions in the NSP.

5.1 Training implications

The ‘PPEB CRB Guide’ of tables 2 and 3 combined with NSP interaction (table 4 and chart 1) are intended to provide a universal operationalisation of the emotional nonverbal aspects of therapeutic relating. In concert, this interactional process can help to restore clients’ autonomy of their self-care and competency.

Psychotherapy training in this approach is not only about ‘what to do with clients’. In order to identify a client’s PPEB, the therapist needs to be aware of his or her own PPEB profile. Psychotherapy training needs to uphold the trinity of the therapist being the motivating operation, the discriminative stimulus as well as the reinforcer to have effective prediction and influence. FAP as a functionally rigorous treatment and training package in conjunction with our process model offers the clinician a workable framework to identify likely contextual CRBs, hence reduce the guesswork of idiosyncratic behavioral analysis down to a manageable and replicable structure.

In a sea of proprietary treatments, the PPEB table along with the Needs-Satisfaction Process can function as a stand-alone process in all modes of treatment, therefore standardizing treatment practice. A small sample study of counselling trainees taught to track and describe patient nonverbal communication was shown to have improved therapeutic alliance scores compared to trainees who received empathy training (Grace, Kivlighan, & Kuncze, 2011), it may be interesting to advance this study with the PPEB and Needs-satisfaction process training. Foundational training in nonverbal communication can increase psychotherapists’ ability to discriminate nonverbal CRBs, generate compassion, and effectively establish therapeutic alliance.

5.2 Implications for research and clinical practice

The PPEB framework we have articulated has important implications for research, as it offers a taxonomy for needs-seeking behavioral variables that can be manipulated under motivation operation conditions without losing external reliability. This brings the importance of therapeutic alliance back into the forefront of research with more precision, aligned with advancing neuroscience to show that relating cannot be separated from treatment.

Moving forward, experimental and observational studies are needed to test the hypothesis

that within the PPEB NSP, relating with heightened nonverbal needs-recognition is an important process of change in treatment. We hope this paper will challenge the rhetoric of ‘non-specific factors’ or ‘common factors’ in therapeutic alliance by bringing scope, precision and depth to efforts to track the dyadic interplay between client and therapist (Hayes, 1987; Hayes et al., 2012).

Extensive research is needed to investigate whether mental health difficulties are related to a certain profile of PPEB unmet needs with corresponding behavioral adjustments. This method of functional classification nests well into the Research Domain Criteria (RDoC) approach to assessment and diagnosis, advocated by the National Institute for Mental Health in the US (Kozak & Cuthbert, 2016; Lilienfeld, 2014). The NSP step 1 of awareness incorporates Valence Systems through the identification of the MO and corresponding PPEB expressions. Then the need-seeking, recognition and satisfaction steps utilises social processes to influence the arousal/regulatory system, with step 5 of fostering new learning through the generalisation of verbal rules activating cognitive processing.

Mediational model suggested by Karver et al. (Karver, Handelsman, Fields, & Bickman, 2005) will necessitate studies to include sets of process variables measured at separate times so that some idea of causality can be considered and tested. In addition, by including sets of process variables in the same study, one would be able to determine which process variables produce the best independent estimates of treatment outcome and which process variables should be discarded from further research. Short term changes in symptoms throughout treatment also should be assessed to test whether symptom change drives changes in relationship constructs or whether changes in relationship constructs drive changes in symptoms. Overall, there is a need in treatment literature that examines the process of treatment as the dynamic interaction between in-session relational constructs and outcome measures.

6.0 Conclusion

Psychopathologies can result from emotional avoidance and/or affective instability. It has been suggested that people have a tendency to assert avoidant control over private experiences (i.e. thoughts, emotions, sensations or urges) through verbal process when they do not have contingent control over their environment. This entails adapting the form,

frequency, intensity, and sensitivity of expression in order to reduce distress and discomfort. Over time this avoidance becomes functionally related to further distress and mental health issues (Boulanger & Hayes, 2010). Borderline personality disorder and bipolar mood disorders are characterised by affective instability (Shedler & Westen, 2004).

Experiential avoidance and regulation of affective instability can be systematically calibrated through mutual tracking of the client-therapist Needs-satisfaction process (chart 1) together with PPEB nonverbal needs-seeking in conditions of deprivation, aversiveness and satiation. Currently there is no operationalized method for psychological attunement or flexibility when these are espoused to be the key to therapeutic alliance and mental health. The taxonomy presented in tables 2, 3, and the algorithm of the NSP dyadic-interaction chart with table 4 serves to help clinicians identify both intra-relational PPEB functional expressions and inter-relational NSP process CRBs in order to increase awareness of verbal and particularly nonverbal variables, thereby influencing intervention.

The therapeutic alliance is, in effect, creating the contingencies for the client and therapist's behavior to operate in mutually reinforcing ways. Fostering clear needs-expression in clients can improve autonomy and impact positively on their assessment of environmental safety (Luyckx, Vansteenkiste, Goossens, & Duriez, 2009). CRB2s are extracted by helping the client learn the function of PPEB nonverbal events of what is helpful and meaningful if expressed contingently. This refined therapeutic process to foster adaptive needs-satisfaction becomes the intervention insofar as the explicit experience of therapist needs-recognition is always the reinforcer.

In FAP, the therapist is required to embody the trinity of i) setting motivating operation, ii) be the discriminative stimulus, and iii) be reinforcer for the client. To encompass all three effectively to increase therapeutic influence, therapists are required to have heightened awareness of their context and learning history, a degree of psychological flexibility in navigating around their emotional systems contingently, as well as have a wide PPEB repertoire to engage in the dance of needs-satisfaction interaction in psychotherapy. Therapists need to be mindful of their own learning history on PPEB NV expressions and work towards compassionate functional expression of this. Responsive therapists can shape more adaptive regulated behavior so that clients can communicate in ways that increase interpersonal effectiveness to meet their basic psychosocial needs.

In the same way we exist in a paradigm of time and behavior, we cannot step outside of relating. The human capacity to relate helps us develop emotional regulation and adaptive problem-solving skills in a given context to promote self-protective or pro-social behaviors. Emotionally attuned therapeutic relationships can create a broader relating experience that make up what clients with interpersonal trauma histories may have missed.

The proposed PPEB Needs-Satisfaction Process, delivered through FAP behavioral analysis, offers a detailed guide to help therapists form influential therapeutic alliances by increasing their awareness of the nonverbal cues of their clients. Responsive therapists can shape more adaptive regulated behavior so that clients can communicate in ways that increase interpersonal effectiveness to meet their basic psychological needs. It remains to be tested whether this model can be a foundational process for successful outcome in psychotherapy.

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